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Improved professional competencies and leadership in PhD-prepared nurses and doctoral students after participating in the cross-national and web-based Nurse-Lead program

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ABSTRACT

Background: Doctor of Philosophy (PhD)-prepared nurses are expected to exercise leadership in their various roles. Therefore, European nurse scholars developed a cross-national web-based Nursing Leadership and Mentoring Educational (Nurse-Lead) program.
Purpose: To evaluate changes in leadership practices, professional and research competencies as well as career development of PhD-prepared nurses and doctoral nursing students after participation in the Nurse-Lead program.
Methods: A pre-post-test evaluation was conducted. Surveys addressed leadership, professional and research competencies, and career development. Quantitative data were analyzed with descriptive statistics and paired sample t-tests. Content analysis was used for qualitative data.
Discussion: The 30 participants showed significant improvements in all leadership practices, professional competencies, and most research competencies. Participants reported increased confidence in decision-making, taking on new responsibilities, and becoming more visible within research teams.
Conclusion: Web-based, international leadership and mentoring programs are promising tools for the leadership and professional development of PhD-prepared nurses and doctoral nursing students.

Introduction

By 2030, nursing care and the nursing profession will look vastly different due to complex health and social issues (National Academies of Sciences, Engineering, and Medicine [NAM], 2021). More than a decade ago, *The Future of Nursing: Leading Change, Advancing Health* report, argued that nurses should achieve higher levels of education to respond to the demands of an evolving health care system, and among its recommendations was that the number of nurses holding a doctorate be doubled by 2020 (Institute of Medicine, 2011). However, the number of nurses with a Doctor of Philosophy (PhD) degree has remained nearly flat (NAM, 2021). This is a concern for the profession since PhD-prepared nurses play key roles in advancing nursing care by generating knowledge and transferring knowledge into clinical practice, education, and health policy as well as teaching the next generation of nurses and nurse researchers (Broome & Fairman, 2018; NAM, 2021).

The number of doctoral programs for nurses has increased in many countries. There, however, are differences in doctoral education

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across continents and countries with differences in titles, curricula, competencies, and career opportunities (Dobrowolska et al., 2021; Kim et al., 2022; Molassiotis et al., 2020). A doctoral degree emphasizing clinical and leadership practice as opposed to the development and execution of an independent research project has emerged in the United States and in some other countries called the Doctor of Nursing Practice. Most PhD-prepared nurses pursue careers in academe, but career opportunities in industry, government, and other settings continue to grow (Broome & Fairman, 2018). Therefore, in anticipation of a range of graduates pursuing a variety of roles, doctoral nursing students need a wide range of professional competencies (Broome & Fairman, 2018; Numminen et al., 2019). Although studies suggest that doctoral education improves research competencies (McNelis et al., 2019; Stanfill et al., 2019), there is evidence indicating that novice doctorally prepared nurses experience difficulties becoming independent academics due to a need to familiarize themselves with the academic environment alongside a need to develop additional competencies (Bullin, 2018; McNelis et al., 2019; Nehls et al., 2016).

Postdoctoral fellowships engage PhD graduates in mentored research training to assist them in developing additional competencies needed to become independent academics (Downs & Morrison, 2011). The period after obtaining the doctorate is considered difficult since novice doctorally prepared nurses need to familiarize themselves with their new roles, while determining their research focus, acquiring grant funding, and developing a publication record (Grassley et al., 2020; McNelis et al., 2019; Stanfill et al., 2019). At the same time, opportunities to conduct research may be limited by teaching obligations, lack of protected time for research, and a lack of mentorship (Al-Nawafleh et al., 2013; Hafsteinsdóttir et al., 2017; Stanfill et al., 2019). Furthermore, in many parts of the world, postdoctoral training opportunities for PhD-prepared nurses are not widely available (Hafsteinsdóttir et al., 2017; McKenna, 2021).

PhD-prepared nurses are expected to show leadership to advance nursing practice and nursing science (van Dongen & Hafsteinsdóttir, 2021). According to Northouse (2016, p. 6) leadership is described as "*a process that entails influence, occurs within a group setting and involves achieving goals reflecting a common vision*." Scientific leadership requires mastery of a full spectrum of research-related skills and developing a personal vision that is inclusive of all involved in knowledge generation and translation (Broome, 2015). Although it is expected that leadership competencies are developed during doctoral education, doctoral students are often not exposed to leadership theories or given opportunities to practice leadership (Broome, 2015). It may be expected that PhD-prepared nurses have strong leadership competencies due to their advanced education, however, it has been proposed that additional leadership training is likely beneficial because they often work in complex positions with diverse roles and responsibilities while experiencing challenging working conditions (Chavez et al., 2021; Hafsteinsdóttir et al., 2017). There is growing evidence for the positive influence of leadership and mentoring programs for doctoral nursing students and doctorally prepared nurses (Hafsteinsdóttir et al., 2017). Although these programs are more common in North America, there is variation in the availability of such programs in other continents (Hafsteinsdóttir et al., 2017; McKenna, 2021).

No earlier web-based, international programs focusing on leadership and professional development of PhD-prepared nurses and doctoral students have been conducted in Europe. Nurse scientists from six European universities developed the "Nursing Leadership Educational and Mentoring" (Nurse-Lead) program aiming to strengthen leadership practices, professional competencies, and academic careers of PhD-prepared nurses and doctoral students.

Aim and Research Questions

The aim of this study was to evaluate changes in leadership practices, professional and research competencies as well the career development of PhD-prepared nurses and doctoral students after participation in the Nurse-Lead program. The following questions guided this program evaluation:

- What indications of changes in leadership practices, professional competencies, research competencies, and career development were seen after participation in the program?
- How do the perspectives of participants toward participation in the program help explain changes in leadership, professional competencies, research competencies, and career development?

Study Design

A pretest and post-test program evaluation with a convergent mixed methods design was used (Polit & Beck, 2017). Surveys were completed at the beginning (2018) and end of the program (2020). In the post-test, open-ended questions were added to validate and elaborate on the quantitative responses (Creswel, 2013).

Method

Study Population and Setting

The study population consisted of 60 PhD-prepared nurses and doctoral students from Finland, Germany, Iceland, Lithuania, the Netherlands, and Portugal, enrolled in the Nurse-Lead program. To take part in the program, the participants were required to (a) have a PhD in nursing or have a registered position as a doctoral nursing student in a PhD program; (b) be engaged in research activities, and (c) be employed at one of six universities involved in the Nurse-Lead project or an organization associated with one of the universities. Information about the program was distributed among the six universities as well as organizations associated with the universities. An application form, statement of interest/intent, Curriculum Vitae, and a letter of recommendation from the manager or PhD supervisor were required to apply for the program. A committee with representatives from the universities was responsible for the selection of the participants based on who would benefit most from participation with an explicit goal of having an equal number of participants from each country.

The Nurse-Lead Program

The Nurse-Lead program is an 18-month web-based program for PhD-prepared nurses and doctoral students working in research. Six European universities developed and executed the program. The online learning environment was provided by Elevate Online Health BV. The Nurse-Lead program included the following components: (a) 7 online course modules for doctoral students and 10 for PhD-prepared nurses; (b) development of individual leadership development plans; (c) individual mentoring trajectories; (d) virtual "Meet the expert sessions" (e) two 2-day Nurse-Lead seminars (van Dongen et al., 2020). More information on the components is provided in Appendix A.

The content of the program was developed based on an earlier leadership and mentoring program for PhD-prepared nurses (Hafsteinsdóttir et al., 2020), the review on leadership and mentoring of postdoctoral nurses (Hafsteinsdóttir et al., 2017) and required competencies for PhD-prepared nurses working in research (Numminen et al., 2019). Participants provided feedback for evaluation on the online modules as well as feedback on the complete program after the end of the program. The consortium held regular meetings to reflect on the program and the program was tailored to the needs of the participants.

The program included the same components for PhD-prepared nurses and doctoral students, however, separate online course

modules were designed for both and therefore they followed the program in separate groups. The PhD-prepared nurses and doctoral students could interact and network during the online and on-site program meetings. The online learning environment enabled online communication within the group as well as one-on-one conversations among participants. In addition to the predetermined activities in the program, individual goals were included in the personal leadership development plans. All program activities were conducted in English. After finishing the program, the participants received a certificate, and doctoral students could request education credits at their universities. Participation in the program was voluntary.

The online courses were moderated by two nurse scientists and the project manager, who provided instructions, monitored course progress, supported participants, and took care of the organization, development, and planning of the learning activities. The moderation and organization took approximately 16 hr per week. On average, the members of the Nurse-Lead consortium spent 1 to 2 hrs a week on the program. Participants either followed the program during working hours or their own time and participation was free of charge for the participants. The time investment for PhD-prepared nurses was estimated to be around 210 hrs and 140 hrs for doctoral students.

Data Collection

Data were collected using online surveys. The pretest measurement was conducted in October 2018 (LD) and the post-test measurement in April 2020 (LS). The survey was provided in English language only since all participants were experienced in conducting research activities in English. A pilot test of the survey was conducted by six professors within the consortium which resulted in minor changes in the wording of some questions. Data were collected using electronic tools in use by the university at the time of the surveys: Explora in the pretest and Castor EDC in the post-test. To increase the response rate, weekly reminders were sent to all participants for 5 weeks via email.

Study Measures

The survey included questions on demographic characteristics, leadership practices, professional and research competencies as well as career development. In the post-test, Visual Analog Scales (VAS) with anchors of *not at all* (0) to *extremely* (10) influential were provided. A set of open-ended questions about individual development, course progress, and commitment to the program was incorporated to gain insight into what extent and how the program influenced participants' competencies (Polit & Beck, 2017). To measure leadership practices, the Leadership Practices Inventory (LPI) instrument was used (Kouzes & Posner, 2016). Although the LPI has been validated (Posner, 2016; Regelink, 2017), the validity of the instruments to measure the professional and research competencies was not evaluated prior to this program evaluation.

Leadership Practices

Leadership practices were evaluated using the LPI (Kouzes & Posner, 2016), which measures the frequency of leadership behaviors on a 10-point Likert scale. The instrument includes a self-assessment and observer assessments and consists of 30 items which are divided into the following leadership practice subscales: (a) Model the way; (b) Inspire a shared vision; (c) Challenge the process; (d) Enable others to act; and (e) Encourage the heart (Kouzes & Posner, 2016). The LPI has excellent face validity and the internal reliability of subscales ranged between 0.81 and 0.90 (Posner, 2016). The LPI also showed excellent content validity (scale content validity index (S-CVI) 92%) and internal consistency (α = 0.90) in Dutch PhD-prepared nurses (Regelink, 2017). Observer assessments were planned but were not included due to an insufficient post-test response rate.

Professional Competencies

Numminen et al. (2019) identified fifteen professional competencies for PhD-prepared nurses working in research which were used to evaluate the professional competencies of the participants (Appendix B). The competencies and definitions were presented, and participants rated their performance using a VAS scale ranging from *not at all* (0) to *extremely* (10) competent.

Research Competencies

Research competencies were extracted from a scoping review which was conducted as a part of a larger review to identify professional competencies for PhD-prepared nurses working in research (Virtanen & Leino-Kilpi, 2018) (Appendix B). Fourteen research competencies were measured using a VAS scale ranging from *not at all* (0) to *extremely* (10) competent.

Career Development

Career development was measured with multiple choice questions on current satisfaction with career progress, perceived impact of the program on career development, and feeling prepared for a career in academe after finishing the program. An open-ended question was used to evaluate changes in positions. A VAS scale was used to measure the influence of the program on career progression ranging from *not at all* (0) to *extremely* (10) influential.

Data Analysis

Means, standard deviations, frequencies, and percentages were used to analyze the data. Before statistical analysis, researchers plotted histograms and checked assumptions of normal distributions using the Shapiro-Wilk test. Paired sample t-tests were used to compare the pretest and post-test data in normally distributed variables and the Wilcoxon-signed rank test was used in non-normally distributed variables (Polit & Beck, 2017). A significance level of .05 was followed. Analyses were performed in SPPS by two researchers (version 26, IBM, Armonk, NY).

Content analysis was used for the narrative data. Open coding was applied and then codes were organized to reflect the emerging concepts based on similarity and connection among the codes (Polit & Beck, 2017). Analysis was conducted by one researcher in close collaboration with two other researchers, who checked the coding process. No member checks with participants were conducted.

Outcomes of quantitative and qualitative data were compared per study parameter and, if possible, qualitative data were used to support or explain quantitative findings. Quantitative and qualitative findings were first described separately and then compared. Regular meetings were held among the researchers to discuss the findings.

Ethical Issues

The study was conducted according to the principles of the Declaration of Helsinki and the General Data Protection Regulation. Permission for this study was obtained from the Ethical Review Board of the University of Iceland (reference 19-004). Participants received a digital information letter. Informed consent was signed digitally and was required before starting the survey. No directly identifiable information was collected and only three members of the research team had access to the original data.

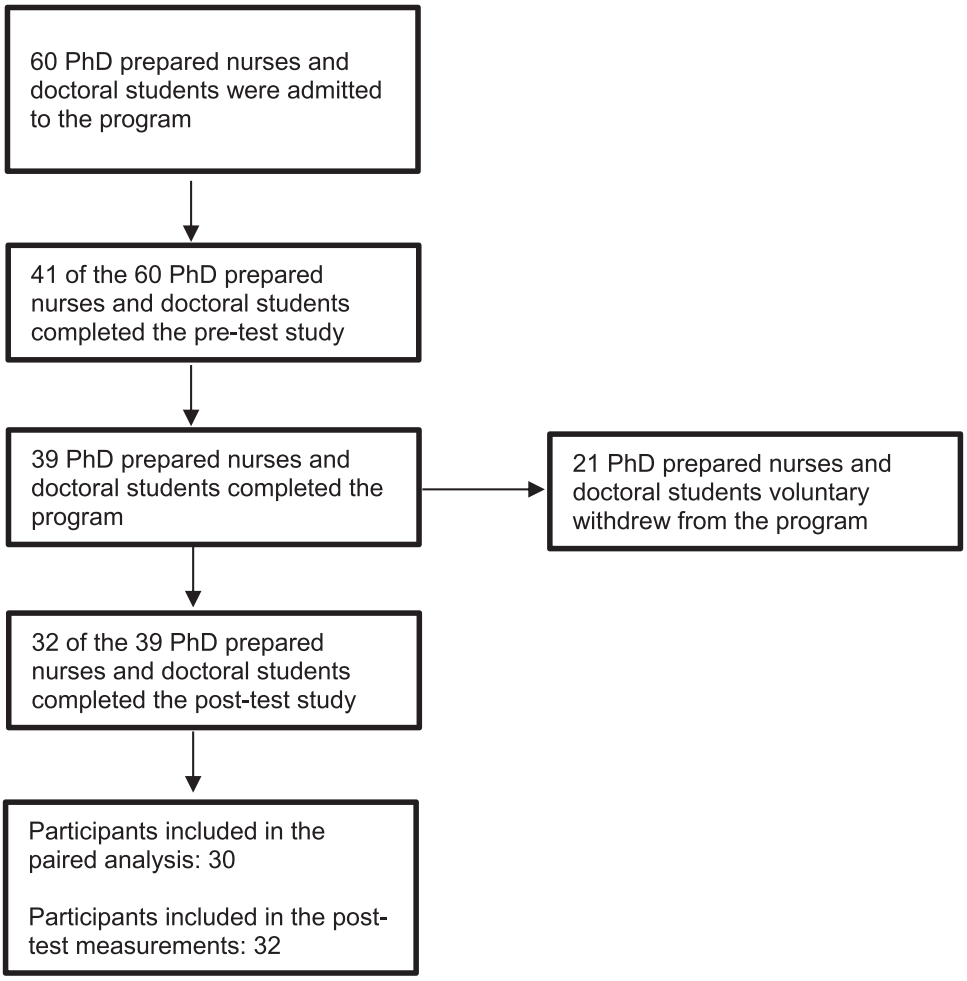

Figure 1. Participant flow. PhD, Doctor of Philosophy.

Results

Demographic Characteristics

A total of 60 PhD-prepared nurses and doctoral students participated in the program, and 39 of them finished the program. In the pretest, 41 participants responded. In the post-test, 32 of the remaining 39 participants responded and of these 2 did not respond to the pretest. Therefore, 30 participants were included in the paired sample analysis and the sample of 32 was used to describe the outcomes that were only measured in the post-test (Figure 1). The reasons for nonresponse were unknown.

Participants originated from 8 countries with Portugal (26.8%), the Netherlands (19.5%), and Finland (17.1%) being the most common. Most of the participants were female (92.7%) and the participants had a mean age of 41.3 years when starting the program. The pre-pest sample included 22 PhD-prepared nurses (53.7%) and 19 doctoral students (46.3%). Most PhD-prepared nurses held positions as postdoctoral researchers (31.7%) or teachers (24.3%). The doctoral students primarily worked as PhD students (68.4%) or clinical nurses (26.3%) (Table 1). In the post-test, 16 PhD-prepared nurses (53.3%) and 14 doctoral students (46.7%) were included. In this sample, participants originated from 7 countries with Portugal (37.5%), the Netherlands (23.3%), and Finland (16.7%) being the most common. PhD-prepared nurses were most often appointed as assistant professors (35.7%) and most doctoral students held positions as PhD students (43.8%) (Appendix C).

Course Progress and Commitment

Of the 32 participants who completed the post-test, 23 (71.9%) completed all course modules at the time of the post-test. Eight participants reported being “very committed” to the program (25%), 14 participants were “committed” (43.8%) whereas 10 participants were “somewhat committed” (31.3%). In the narratives, 10 participants described that they valued the program because of the opportunity to develop professional competencies. Sixteen participants stated that the time investment for the program was higher than anticipated, which made it challenging to combine it with work commitments.

Leadership Practices

In both the pretest and post-test, the highest mean scores among participants were reported on the LPI subscales: *Enable others to act* (47.6 vs. 53.4) and *Encourage the heart* (42.6 vs. 49.7). Improved average scores were found for all the LPI subscales in the total sample and for the groups of PhD-prepared nurses and doctoral students separately. Statistically significant improvements were found for all LPI subscales for the total group: *Model the way* ($p < .001$), *Inspire a shared vision* ($p < .001$), *Challenge the progress* ($p < .001$), *Enable others to act* ($p < .001$) and *Encourage the heart* ($p = .001$) (Table 2). The participants valued the meaning of the program for their leadership development with a mean of 7.5 out of 10 (standard deviation (SD) 2.00) on the VAS scale.

Table 1
Demographic Characteristics of the Participants

Variables	PhD-prepared Nurses (*N* = 22) *N* (%)	Doctoral Students (*N* = 19) *N* (%)	Total (*N* = 41) *N* (%)
Gender			
Female	20 (90.9%)	18 (94.7%)	38 (92.7%)
Male	2 (9.1%)	1 (5.3%)	3 (7.3%)
Age (in years)			
Mean ± SD	45.5 ± 6.1	36.5 ± 8.0	41.3 ± 8.3
Min–max	34–54	25–53	25–54
20–30 years		4 (21.1%)	4 (9.8%)
31–40 years	7 (31.8%)	8 (42.1%)	15 (36.6%)
41–50 years	8 (36.4%)	6 (31.6%)	14 (34.1%)
51–60 years	7 (31.8%)	1 (5.3%)	8 (19.5)
Nationality			
Portuguese	6 (27.2%)	5 (26.3%)	11 (26.8%)
Dutch	5 (22.7%)	3 (15.8%)	8 (19.5%)
Finnish	4 (18.2%)	3 (15.8%)	7 (17.1%)
German	2 (9.1%)	4 (21.1%)	6 (14.6%)
Lithuanian	2 (9.1%)	2 (10.5%)	4 (9.8%)
Icelandic	2 (9.1%)	1 (5.3%)	3 (7.3%)
Austrian		1 (5.3%)	1 (2.4%)
Belgian	1 (4.5%)		1 (2.4%)
Years since PhD*			
0–3 years	13 (61.9%)		
4–6 years	5 (23.8%)		
7–9 years	2 (9.5%)		
10–12 years	1 (4.8%)		
Position(s)†			
PhD student		13 (68.4%)	13 (31.7%)
Teacher	6 (27.3%)	4 (21.1%)	10 (24.4%)
Postdoctoral researcher	7 (31.8%)		7 (17.1%)
Clinical nurse	1 (4.5%)	5 (26.3%)	6 (14.6%)
Nurse scientist	1 (4.5%)	4 (21.1%)	5 (12.2%)
Senior researcher	4 (18.2%)		4 (9.8%)
Assistant professor	2 (9.1%)	1 (5.3%)	3 (7.3%)
Associate professor	1 (2.4%)		1 (2.4%)
Professor	3 (13.6%)		3 (7.3%)
Other	6 (27.3%)	2 (10.5%)	8 (19.5%)
Areas of work†			
Research	21 (95.5%)	17 (89.5%)	38 (92.7%)
Education	21 (95.5%)	14 (73.7%)	35 (85.4%)
Clinical practice	3 (13.6%)	6 (31.6%)	9 (22%)
Management	6 (27.3%)	3 (15.8%)	9 (22%)
Other	3 (13.6%)	1 (5.3%)	4 (9.8%)
Type of organization			
University	8 (36.4%)	7 (36.8%)	15 (36.6%)
University of Applied Sciences	2 (9.1%)	7 (36.8%)	9 (22%)
University Medical Centre	5 (22.7%)	2 (10.5%)	7 (17.1%)
General Hospital	2 (9.1%)	2 (10.5%)	4 (9.8%)
Community Care Organization		1 (5.3%)	1 (2.4%)
Other	5 (22.7%)		5 (12.2%)

Note. PhD, Doctor of Philosophy; SD, standard deviation.
* Missing data from one PhD-prepared nurse.
† Frequencies do not add up to the sample size since participants could select multiple answers.

Contribution of the Program to Leadership Practices

In line with the improved LPI scores, in the self-reported narratives, 23 participants stated that the program contributed to their leadership practice by gaining knowledge about leadership theories and practices as well as focusing on the transfer of the knowledge into work practices. This was demonstrated by participants feeling more confident in their work and taking on new responsibilities, using more creative approaches in their work, and daring to take calculated risks. Ten participants reported becoming more aware of the importance of team leadership by managing group processes within professional teams, and their own behavior toward others. Also, they became more visible in teams and made independent decisions toward their own research (programs). In addition, the importance of a shared vision and goals, self-reaction, understanding and strengthening own roles, speaking openly about values to others, praising and encouraging others as well as celebrating successes were mentioned as examples to demonstrate improved leadership competencies. Mentors had an important role in the leadership development and the collaboration with international peers was highly valued as this provided new insights toward their research and professional development.

Professional Competencies

The highest mean scores among the 30 participants in both the pretest and post-test were reported on the following professional competencies: (a) *Team working management* (7.6 vs. 8.4); (b) *Research ethics management* (7.4 vs. 8.4); (c) *Pedagogy management* (7.4 vs. 8.4); and (d) *Intercultural management* (7.3 vs. 8.1). Improved scores were observed on all professional competencies both for the total sample as well as in the groups of PhD-prepared nurses and doctoral students. Statistically significant improvements were found for all competencies across the total sample (Table 2). The participants valued the meaning of the program for professional competencies with a mean score of 7.03 (SD 1.98) on the VAS scale.

Contribution of the Program to Professional Competencies

In line with the improved professional competencies, in the narratives, 25 participants described that the program had a positive influence on their professional development. Among other things, the program made them aware of their professional development and provided time to focus on this. The program contributed to the development of various competencies including improved team management and networking competencies. The participants considered that mentoring was important for their professional development.

Two participants, however, felt that the program had a limited contribution to their professional development. Although they became more aware of their own professional competencies, they felt that the program did not result in any or long-term changes in their practices. Another participant commented that it was difficult to distinguish if the professional growth was a result of the program, work experiences, or a combination of both.

Research Competencies

In the pretest and post-test, participants showed the highest scores on the following competencies: (a) *Ethical guidelines and codes* (8.3 vs. 8.8); (b) *Ability to share information* (7.9 vs. 8.3); and (c) *Understanding of the literature related to the topic of interest & the construct of a research proposal* (7.7. vs. 8.2). Improved scores on all research competencies were observed in both the total sample and the sample of PhD-prepared nurses. Improved scores in the sample of doctoral students were found in all competencies except *Grant writing,* which remained the same. In the total sample, statistically significant improvements were found in the majority of research competencies, however, no statically significant improvements were found for the competencies of *Academic writing* ($p = .178$), *The ability to share information* ($p = .070$), *Grant writing* ($p = .245$), and *Presentation skills* ($p = .112$). The participants valued the meaning of the program for research competencies with a mean score of 6.70 (SD 2.01) (Table 3).

Table 2
Leadership and Professional Competencies

		Mean (SD) Pretest	Mean (SD) Post-test	Pretest vs. Post-test
Leadership practices[*]				
1	Model the way[†]	41.7 (7.2)	49.4 (4.6)	$p < .001$[*]
2	Inspire a shared vision[†]	39.7 (9.7)	47.2 (6.2)	$p < .001$[*]
3	Challenge the process[†]	42.1 (8.0)	48.5 (6.0)	$p < .001$[*]
4	Enable others to act[‡]	47.6 (8.0)	53.4 (2.9)	$p < .001$[*]
5	Encourage the heart[‡]	42.6 (8.6)	49.7 (50)	$p = .001$[*]
Professional competencies[§]				
1	Research field management[†]	6.4 (1.7)	7.4 (1.0)	$p = .001$[*]
2	Research skill management[‡]	6.4 (1.9)	7.4 (1.1)	$p = .003$[*]
3	Research ethics management[†]	7.4 (1.3)	8.4 (1.0)	$p = .001$[*]
4	Cognitive management[†]	7.3 (1.2)	8.1 (0.9)	$p = .001$[*]
5	Self-management[‡]	7.3 (1.6)	8.0 (1.2)	$p = .016$[*]
6	Research communication management[†]	7.2 (1.5)	7.8 (0.9)	$p = .042$[*]
7	Team working management[†]	7.6 (1.2)	8.4 (0.8)	$p = .001$[*]
8	Team leadership management[‡]	6.3 (2.0)	7.8 (1.1)	$p < .001$[*]
9	Resource management[‡]	6.3 (1.8)	7.7 (0.8)	$p < .001$[*]
10	Career management[†]	6.7 (1.6)	7.7 (1.0)	$p = .001$[*]
11	Pedagogy management[‡]	7.4 (1.8)	8.2 (1.1)	$p = .013$[*]
12	Implementation management[†]	6.4 (1.8)	7.6 (1.0)	$p = .001$[*]
13	Future vision management[†]	6.5 (1.8)	7.9 (0.9)	$p < .001$[*]
14	Intercultural management[†]	7.3 (1.9)	8.1 (0.9)	$p = .017$[*]
15	Technology management[†]	6.6 (2.0)	7.7 (1.1)	$p = .001$[*]

Note. SD, standard deviation.
[*] Leadership Practice Inventory.
[†] Paired sample t-test.
[‡] Wilcoxon-signed rank test (non-normal distribution).
[§] Professional competencies by Numminen et al. (2019).

Table 3
Research Competencies

		Mean (SD) Pretest	Mean (SD) Post-test	Pretest vs. Post-test
1.	Academic writing[*]	7.0 (1.7)	7.5 (1.2)	$p = .178$
2.	Understanding of the literature related to the topic of interest and the construct of a research proposal[†]	7.7 (1.3)	8.2 (1.0)	$p = .037$[‡]
3.	Critical and creative thinking/competence[†]	7.4 (1.2)	8.1 (1.1)	$p = .002$[‡]
4.	Scientific thinking[*]	7.5 (1.2)	8.1 (0.9)	$p = .003$[‡]
5.	Ability to network[†]	7.0 (2.1)	8.0 (1.0)	$p = .004$[‡]
6.	Ability to share information[†]	7.9 (1.1)	8.3 (0.9)	$p = .070$
7.	Defend one's ideas[†]	7.6 (1.1)	8.2 (1.0)	$p = .002$[‡]
8.	Defend one's performance[*]	7.4 (1.1)	8.0 (0.9)	$p = .003$[‡]
9.	Publishing skills[*]	6.4 (1.6)	6.9 (1.9)	$p = .005$[‡]
10.	Ethical guidelines and codes[†]	8.3 (1.0)	8.8 (0.7)	$p = .009$[‡]
11.	Grant writing[†]	6.1 (1.8)	6.5 (2.0)	$p = .245$
12.	Conference presentations[*]	7.6 (1.6)	8.1 (0.9)	$p = .025$[‡]
13.	Presenting skills[*]	7.6 (1.4)	8.1 (0.8)	$p = .112$
14.	Language skills[†]	7.0 (1.6)	7.6 (1.4)	$p = .007$[‡]

Note. SD, standard deviation.
[*] Wilcoxon-signed rank test (non-normal distribution).
[†] Paired sample t-test.
[‡] Significant findings.

Contribution of the Program to Research Competencies

In the narrative responses, 17 participants described that they highly valued the opportunity to reflect on their research (competencies) with international peers. Participants described improved scientific thinking, research management competencies, new strategies to brand their research, and improved knowledge of research ethics as examples to demonstrate improved research competencies. Two doctoral students described that they improved their English language skills. However, 7 PhD-prepared nurses felt that the program had a limited or no contribution to the development of their research competencies as they felt these competencies were not the central focus of the program and/or were not the focus of their professional development.

Career Development

In the post-test, all 32 participants were satisfied with their career development. Three participants (9.4%) were "extremely" satisfied, 18 participants (56.3%) were "very" satisfied, and 11 participants (34.4%) described being "somewhat" satisfied with their career development. The participants valued the meaning of the program for their career development with a mean score of 6.32 (SD 2.57). After the program, 31 of the 32 participants felt prepared for an academic career (97%). Eight participants moved into new positions during the program.

Contribution of the Program to Career Development

In the narrative responses, 17 participants described that the program was valuable for their career development as it was—among other things—an opportunity to develop their knowledge, skills and competencies and provided an opportunity to establish international connections. The program supported the participants to develop a vision for their careers and they made plans for their careers. They also explored career decisions to reach career goals and the program helped to gain insights toward future ambitions. Both PhD-prepared nurses and doctoral students articulated their future ambitions, which varied based on individual preferences. A trend that became apparent across nine participants was that the participants would like to spend more time on their research.

Discussion

The findings of this program evaluation suggest that the participants strengthened a wide range of leadership, professional, and research competencies. Overall, similarities between the quantitative measures and the narratives were found. The narratives

provided explanations for the changes in the leadership, professional, and research competencies. The Nurse-Lead program seemed to have the most meaning for the development of leadership and professional competencies, thereby strengthening their performance in the fields where they work. Also, the program was important for the development of international networks and peer collaboration among PhD-prepared nurses and doctoral students.

The Nurse-Lead program was developed based on the earlier Dutch Leadership Mentoring in Nursing Research (LMNR) program (Hafsteinsdóttir et al., 2020). The Nurse-Lead program is an online, international program focusing on both doctoral students and PhD-prepared nurses, whereas the LMNR program only included PhD-prepared nurses, who attended on-site meetings. The findings of both studies showed improved scores on all leadership practices after participation measured with the LPI. In both the Nurse-Lead and LMNR programs, participants described considering career steps, strengthening research (programs) while gaining a stronger voice, improving teamwork, and gaining more confidence (van Dongen et al., 2021). The LMNR participants mobilized themselves as a group of experts in nursing science in the Netherlands (van Dongen et al., 2021) and this movement may have been facilitated by the strong connections between fellows. The Nurse-Lead participants, however, seemed to focus more on individual progress. Due to the online and asynchronous design, there were limited opportunities to work together as a group. The LMNR program was found to be stimulating because of inspiring meetings where colleagues met and engaged onsite, while in the web-based Nurse-Lead program, the participants met online which was convenient when connecting with international peers and mentors.

Mentoring was found to be an important aspect of the program. The benefits of mentoring have been reported in many earlier studies and include among other things: personal growth, improvement of academic knowledge, increased scholarship productivity, and promotion of career success (Busby et al., 2022; Cullen et al., 2017; Hafsteinsdóttir et al., 2017; Nersesian et al., 2019). Mentoring can be established in many forms (Busby et al., 2022). The approach chosen in the Nurse-Lead included mentoring based on individual needs. This is important since most PhD-prepared nurses and doctoral students need to develop a wide range of (specific) competencies (Numminen et al., 2019) and therefore they may benefit from an experienced mentor who is an expert within the same research area and is located at the organization or geographical area. Most participants chose experienced mentors, which is important since the participants themselves need to acquire mentoring competencies to mentor the next generation of nurses early in their careers due to the rapid growth of science combined with an aging faculty workforce (Broome et al., 2021). Improved (international) networks and collaborations within the nursing science community and specific research areas may facilitate mentoring becoming available to a larger number of doctoral students and PhD-prepared nurses.

Several lessons were learned for future improvements to the Nurse-Lead program. There were relatively high dropout levels (35%). High workloads and personal circumstances were often reported as a reasons for not completing the program, however, reasons for dropout were not always known. The time investment of the program was considered high according to the participants and is expected to contribute to already high workloads. High workloads are common in PhD-prepared nurses and doctoral students (Aquino et al., 2018; Smeltzer et al., 2016) and are often caused by heavy teaching and administrative commitments combined with research activities (Al-Nawafleh et al., 2013; Singh et al., 2021). It, therefore, is important that leaders or managers of organizations where the PhD-prepared nurses and doctoral nursing students work and/or study discuss the needs of individuals to facilitate participation in programs like this because working on professional and career development requires time and commitment. By sharing the responsibility for clearing time to participate in the program, the participants may feel more supported to prioritize their professional development. The levels of drop-out may also be reduced by clarifying the time investment at the start of the program so that participants have realistic expectations. Also, we would recommend placing the course module about work–life balance at the beginning of the program rather than at the end to support the development of strategies to successfully complete the program. Another point is that the commitment could be increased by strengthening the interaction among the participants during the program by facilitating more on-site meetings, especially at the start of the program. Although we believe that there was trust among the participants and confidentiality was respected, more opportunities for on-site meetings might have strengthened connections within the group and therefore might have increased the commitment. The findings of this program evaluation study can be used to optimize the content of the program for future use. In the future, more attention may be devoted to important competencies such as academic and grant writing, which did not significantly improve. It is, however, important to explore the needs of future participants; in the next iterations, the program design could incorporate individualized content based on assessments of participants' developmental needs.

The findings of this evaluation indicate that web-based, international programs like the Nurse-Lead program may contribute to the professional and career development of doctoral students and PhD-prepared nurses. For doctoral students programs such as Nurse-Lead can contribute to the traditional doctoral education as the program provides the opportunity to develop specific competencies based on individual needs and preferences. PhD-prepared nurses can especially benefit from these types of programs when they are offered early in the postdoctoral period since this period is often described as difficult and further development of competencies is often required to become an independent scientist (Dunbar-Jacob & Hravnak, 2021; McNelis et al., 2019; Stanfill et al., 2019). Although there were limitations in the study design, the results suggest that the Nurse-Lead program should continue to be refined and its use increased. Also, it would be recommended to offer these programs to PhD-prepared nurses working outside academia as well as to a broader group of doctorally prepared nurses. Certain aspects of the program would need to be tailored to the needs of specific groups, such as nurses holding practice-oriented doctoral degrees and those working in nonacademic settings. However, it appears that programs like the Nurse-Lead may be relevant for a broader group of doctorally prepared nurses given they experience similar challenges in their work and professional development.

Based on our findings, we recommend policymakers to provide structural funding for the further development and evaluation of leadership and mentoring programs to make these types of programs available to a larger group of doctoral nursing students and doctorally prepared nurses across countries worldwide. Offering the program to a broader group of nurses across more continents is expected to broaden access to mentoring in countries with limited resources for PhD-prepared nurses. This would require nursing science departments to engage in cross-national collaborations. Web-based delivery allows a more thorough evaluation in a more multicultural setting, across countries and continents. Enabling doctorally prepared nurses to participate in programs like the Nurse-Lead program will result in them becoming better equipped to develop successful careers and develop to their full potential early in their careers. As a result, PhD-prepared nurses and doctoral nursing students will receive support on their path to becoming future leaders in nursing, where are expected to advance nursing care, nursing discipline, and nursing science, which ultimately may improve the outcomes of patients, and communities worldwide.

Limitations

The findings of this program evaluation study should be interpreted carefully due to several limitations. There was a delay in

reporting and publishing this study, although the findings still are considered to be relevant, it needs to be taken into account that data were collected in 2018 and 2020. Besides, it is important to note that the sample size is relatively small, and of the sample only 23 out of the 30 participants completed all online course modules at the time of the post-test. Of these participants, three participants completed three course modules, two completed five modules and two completed eight modules. It is important to note that these participants were working on their professional development based on their individual development plans and engaged in mentoring. Also, this study relies on self-report measures. Despite that observer assessments were planned, an insufficient number of observers responded to the post-test, which may have been due to the increased workload during the COVID-19 pandemic. Selection bias may have been introduced since the Steering Committee distributed invitations for applications and selected participants. Specifically, those who were already highly invested in their career and professional development may have been more likely to have an interest in and to be selected for the program. Also, those who were active and engaged in the program may have been more likely to participate in this study and report positive experiences. Due to a lack of validated instruments to measure professional and research competencies in PhD-prepared nurses and doctoral students, nonvalidated instruments were used, which could have introduced bias into our findings. The program and evaluation were conducted in English, which may have influenced the learning process and evaluations, however, this influence is expected to be limited since all participants were proficient in English. Lastly, the professional growth of the participants could have been influenced by factors other than the Nurse-Lead program, like individual, work or other educational experiences. In the future, more robust research including larger samples and comparison groups is recommended to unravel and gain insight into the influence of the program and other factors on the professional and leadership development of doctoral nursing students and PhD-prepared nurses.

Conclusion

The Nurse-Lead program was beneficial for the career development of PhD-prepared nurses and doctoral students, who significantly improved their leadership and professional competencies as well as most research competencies. The program made participants aware of the importance of leadership and professional development and supported them in strengthening their performances. The participants experienced mentoring and collaboration with peers from other universities across countries as highly beneficial aspects of the program. In the future, PhD-prepared nurses and doctoral students need to serve as leaders, mentors, and role models for other nurses entering the profession. Therefore it is recommended to develop more international leadership and mentoring programs and make them widely available to PhD-prepared nurses and doctoral students and consider expanding to other types of doctoral students and graduates across all continents worldwide.

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CRediT Statement

Lisa van Dongen: Conceptualization, Methodology, Investigation, Formal analysis, Writing – Original draft. *Lisa Suidman*: Methodology, Investigation, Formal analysis, Validation, Writing – Review and Editing. *Maria Adriana Henriques*: Conceptualization, Methodology, Investigation, Writing – Review and Editing. *Helga Jónsdóttir*: Conceptualization, Methodology, Investigation, Writing – Review and Editing. *Helena Leino-Kilpi*: Conceptualization, Methodology, Investigation, Writing – Review and Editing. *Christiane Luderer*: Conceptualization, Methodology, Investigation, Writing – Review and Editing. *Riitta Suhonen*: Conceptualization, Formal analysis, Writing – Review and Editing. *Thóra B. Hafsteinsdóttir*: Conceptualization, Methodology, Validation, Investigation, Writing – Review and Editing, Supervision.

Availability of Data

Data are available from the corresponding author upon reasonable request.

Declaration of Competing Interest

The authors declare no conflicts of interest.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.outlook.2024.102144.

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