Entrepreneurship Training Program for Nurses and its Effect on Professional Identity at King Khalid Hospital in Hail, Saudi Arabia

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Abstract:

Background: *Entrepreneurship for nurses is an emerging trend that empowers nursing professionals to influence their skills and expertise in innovative ways, often leading to the creation of new healthcare solutions or practices. Engaging in entrepreneurship allows nurses to redefine their professional identity beyond traditional roles.* ***Aim:*** *To evaluate the entrepreneurship training program for nurses and its effect on professional identity at King Khalid Hospital in Hail, Saudi Arabia.* ***Method****: Quasi experimental design was used at all inpatient departments in King Khalid Hospital on (115 staff nurses) using three tools were used for data collection in the present study namely, Entrepreneurship Knowledge Assessment Questionnaire, Entrepreneurial Intention Questionnaire, and Professional Identity Scale.* ***Results:*** *The total Entrepreneurship Knowledge Assessment level showed the most striking transformation: high knowledge level surged from 28.7% pre-training to 88.7% immediately post-training, and maintained at 74.8% after 3 months, while low knowledge level plummeted from 53.0% to only 6.1% (P = 0.0001). Immediately after the program, there was a remarkable transformation in Entrepreneurial Intention score. Immediately after the program implementation, there was a remarkable shift in perceived Professional Identity score, with high perception levels increasing to 45.8%.* ***Conclusion****: It was concluded that implementing an entrepreneurship training program produced statistically significant improvements in staff nurses' entrepreneurship knowledge, entrepreneurial intention, and perceived professional identity across different phases of the training program.* ***Recommendations****: Adopt and institutionalize entrepreneurship training programs as a mandatory component of nurses' continuing professional development curricula and integrate entrepreneurship concepts into regular unit-based training sessions and staff meetings to reinforce and sustain the knowledge gained.*

Keywords: *Entrepreneurship Training Program, Nurses, Professional Identity*

Introduction

In the field of health, entrepreneurship has gained relevance in recent years due to its potential to address critical challenges in the healthcare system. Health entrepreneurship aims to create value by enhancing the quality of care as well as reducing costs, which can lead to a significant transformation of the healthcare system. Entrepreneurship for nurses is an emerging trend that empowers nursing professionals to influence their skills and expertise in innovative ways, often leading to the creation of new healthcare solutions or practices. (Melnyk, & Tim Raderstorf, 2024).

As nurses engage in entrepreneurial activities, they not only expand their career opportunities but also contribute to the evolution of healthcare delivery, ensuring that patient care remains at the forefront of their initiatives. Engaging in entrepreneurship allows nurses to redefine their professional identity beyond traditional roles. As they take on new challenges, nurses develop confidence in their abilities, enhancing their self-perception and professional identity (Jakobsen, Qvistgaard, Trettin, & Juel Rothmann, 2021).

Entrepreneurship for nurses refers to the process by which nursing professionals identify opportunities within the healthcare landscape and leverage their skills, knowledge, and experience to create innovative solutions, services, or products. (Brooks, 2024). This entrepreneurial approach empowers nurses to take the initiative in addressing challenges in patient care, healthcare delivery, and overall health management. By venturing into entrepreneurship, nurses can expand their roles beyond traditional clinical settings, thus contributing to the evolution of healthcare practices (del Arco Bravo, & Muñoz Gimeno, 2024).

The importance of entrepreneurship for nurses lies in its potential to drive change and innovation within the healthcare sector. By starting their ventures, nurses can address unmet needs in patient care, create new care models, and enhance the overall quality of healthcare services. Entrepreneurial nurses can also influence policy and practice by introducing evidence-based solutions that improve patient care, thereby elevating the nursing profession's status within the healthcare system (Macedo, et al., 2024).

Several factors influence the entrepreneurial journey of nurses. The increasing demand for healthcare services and the need for innovative solutions create fertile ground for entrepreneurial ventures. advancements in technology, such as telemedicine and mobile health applications, provide new platforms for nurses to reach and engage with patients. Additionally, supportive policies and funding opportunities can facilitate the establishment of nurse-led businesses, encouraging

more nurses to pursue entrepreneurship (Abdel Rahman, & Abdelatief, 2024).

Despite the potential rewards, nurse entrepreneurs also face challenges. Limited access to funding, lack of business knowledge, and navigating regulatory requirements can pose significant obstacles. Moreover, balancing clinical responsibilities with entrepreneurial pursuits can be demanding. To overcome these challenges, nursing entrepreneurs can seek mentorship, participate in entrepreneurial training programs, and collaborate with other healthcare professionals to share resources and knowledge. (Glover, Crocker, & Brush, 2024).

Entrepreneurship in nursing serves as a transformative force, reshaping traditional professional identities and expanding the scope of nursing practice. Nurse entrepreneurs leverage their clinical expertise, creativity, and insight to develop innovative healthcare solutions. By stepping into entrepreneurial roles, nurses challenge conventional norms and redefine their professional identity from caregivers to independent healthcare innovators. This transition fosters autonomy, flexibility, and a broader perspective on the nursing profession, enabling nurses to address healthcare challenges in novel ways (Jakobsen, et al., 2021).

The professional identity of nurses is shaped by various factors, including education, clinical experiences, and the evolving healthcare landscape. As nurses engage in their practice, they develop a sense of belonging to the nursing profession, which is crucial for their overall job satisfaction and effectiveness. This identity influences their approach to patient care, collaboration with other healthcare professionals, and advocacy for their patients and the nursing profession itself (Al-Noumani, Al Zaabi, Arulappan, & George, 2024).

A well-defined professional identity contributes to enhanced job satisfaction, improved patient outcomes, and effective teamwork. When nurses have a strong sense of identity, they are more likely to take pride in their work, advocate for their patients, and engage actively in their professional development. (Liao, Xie, Ou, Yang, & Zou, 2024). Educational experiences play a significant role, as nursing programs instill essential knowledge, skills, and values that shape a nurse's identity. Additionally, mentorship and clinical experiences provide opportunities for nurses to observe and adopt professional behaviors. The organizational culture and support within healthcare settings also impact on how nurses perceive their roles and responsibilities. Additionally, societal perceptions of nursing may affect how nurses view their roles and contributions (Yi, et al., 2024).

Significance of Study

Nursing entrepreneurship, or nurses with entrepreneurial motivations, can provide opportunities for professionals to pursue innovative ideas and approaches to improve health outcomes. Nursing entrepreneurship is a developing role that inspires innovation and advances scientific knowledge (Malakoti, et al., 2023). Nursing Entrepreneurship presents an opportunity to explore nursing's professional potential in nursing practice and increase recognition of the value of nursing services. One of the recognized segments of entrepreneurship is the nurse entrepreneur, where an autonomous independent nurse works directly with clients in a private practice setting. It is widely believed that nursing entrepreneurs offer a cost-effective alternative for specific types of health services (Gardim, et al., 2024).

Nurses who have a strong professional identity are more likely to act as role models for new nurses, helping to shape the professional identity of future generations of nurses. Launching and running a successful nursing entrepreneurship is not easy since various factors influence the transition from nurse to entrepreneur (Joseph, et al., 2023) (Hanum, Hu, Wei, Zhou, & Ma, 2023). Therefor the aims of the current study are to evaluate the entrepreneurship training program among nurses and its effect on professional identity at King Khalid Hospital in Hail, Saudi Arabia

Aim of the study

This study aims to evaluate the entrepreneurship training program for nurses and its effect on professional identity at King Khalid Hospital in Hail, Saudi Arabia.

Research Hypothesis :

H1. Nurses' knowledge regarding entrepreneurship improves after implementing entrepreneurship training program.
H2. Nurses' level of professional identity improves after implementing entrepreneurship training program.

Method

Research design

Quasi experimental (pre – post) research design was used to achieve the aim of this study.

Setting

This study was conducted at all inpatient departments in King Khalid Hospital as it is the first referral hospital in the Hail region, with a bed capacity of 285 beds.

Participants

Convenience sample was utilized, which included 115 staff nurse, within at least 1 year of experience and who are available at time of data collection and willing to participate in the study.

Tools of data collection:

Three tools were used for data collection in the present study namely, Entrepreneurship Knowledge Assessment Questionnaire, Entrepreneurial Intention Questionnaire, and Professional Identity Scale.

Tool I: Entrepreneurship Knowledge Assessment Questionnaire.

This questionnaire comprised two parts:

The first part was used to identify personal characteristics of nurses included: age, sex, educational qualification, years of experience, and unit of work.

The second part: It was developed by the researcher based on the review of related literature (Chrisman, Jack, Kellermanns, Rosenbusch, & Wennberg, 2026; Kumar, Gangadhara, Rani, Kusuma, & Ravi, 2026; Mhlongo, Ntshangase, & Ezeuduji, 2026) and to assess nurse's knowledge regarding entrepreneurship before and after the implementation of the training program and there were 30 questions. The questions were in two forms true and false and multiple-choice questions. Responses are either correct or incorrect. Correct answer was taking (1) score while incorrect answer was taken (0).

Scoring system

The scoring system of Entrepreneurship Knowledge Assessment Questionnaire was classified into two categories based on a predetermined cut-off points, as follows:

- Low level (<60% of total scores),
- Moderate level (60-75% of total scores)
- High level (≥75% of total scores).

Tool II: Entrepreneurial Intention Questionnaire:

It was developed by Orman (2009) to measure nurses' entrepreneurial intention and consisted of six items. This instrument

was scored through 5- points Likert scale, with (1) for strongly disagree, (2) disagree, (3) to some extent, (4) agree and (5) for strongly agree.

Scoring system:

The scoring system of Entrepreneurial Intention Questionnaire was classified into two categories based on a predetermined cut-off points, as follows:

- Low level (<60% of total scores),
- Moderate level (60-75% of total scores)
- High level (≥75% of total scores).

Tool III: Professional Identity Scale:

The tool was developed by Reinders et al., (2020). It aims to assess staff nurses' levels toward professional identity and consists of 24 items divided under three dimensions namely, inter professional belonging (8 items), inter professional commitment (8 items) and professional belief (8 items). The responses were measured by five -point Likert ranging from (1= strongly disagree) to (5 =strongly agree)

Scoring system:

The scoring system of Professional Identity Scale was classified into two categories based on a predetermined cut-off point, as follows:

- Low level (<60% of total scores),
- Moderate level (60-75% of total scores)
- High level (≥75% of total scores).

Validity and reliability

The study tools were tested for face and content validity by jury test of five experts in the field of Nursing Administration to evaluate the individual items as well as the entire instrument as being relevant and appropriate to test what it wanted to measure. Reliability testing was done and judged by how well the items that reflect the same construct yield similar results and were tested for its reliability by using Cronbach alpha test and knowledge test was modified and translated to Arabic language by the researcher.

Total validity Index of the questionnaires was 98%.

-To assess reliability, the questionnaires were tested by the pilot subjects at first session for calculating Cronbach's Alpha. It was 0.790 for Entrepreneurship Knowledge Assessment Questionnaire and 0.807 for Tool II: Entrepreneurial Intention Questionnaire and 0.811 for Tool III: Professional Identity Scale.

Pilot study:

It was conducted on 10% **(n=11)** of the study sample to test the feasibility and clarity of the tools and was randomly selected and excluded from the study sample. Necessary modifications were made accordingly.

Ethical Consideration:

Ethical approval was obtained from the Research Ethical Committee of Faculty of Nursing, Mansoura University (code n=667). Official permission to conduct the study was obtained from the administrator responsible for the selected hospital. All participants were informed that their participation is voluntary, and they have the right to withdraw from the study at any time. All participants were assured of the confidentiality of the collected data, and the privacy of the study sample was assured at all phases of the study. A written informed consent was obtained from the participants who agree to participate in the study after explanation of the nature and aim of the study.

Data Collection:

Data collection for this study was through the following:

- An official permission was issued from the Faculty of Nursing, Mansoura University to carry out the study then an official letter will be issued with approval from the director of King Khalid Hospital in Hail, Saudi Arabia after explanation of the aim of the study and the schedule of data collection.
- The researcher was meet the participants individually to clarify the aim of the study and get the approval to participate in the study. Three tools of data collection were distributed to nurses according to predetermined unit schedule.
- The researcher presented all the time of data collection for clarification, as well as the data collected during this phase constituted the pretest for the study.
- Based on the data collected and with the help of literature review, the researcher designed an entrepreneurship training program for nurses.
- The time plan of the program was implemented over the period from the beginning of April 2024 to end of September 2024. Staff nurses were divided into three groups. The training program implemented in the morning and evening shifts three days a week . The training program has taken 8 hours distributed as the following: 4 sessions for each group every session (2) hour.

Session (1)
- Definition of the entrepreneur & entrepreneurship
- The importance of Entrepreneurship
- The Functions of Entrepreneurship
- The 4 Types of Entrepreneurships

Session (2)
- The entrepreneurial process
- Components are essential to successful entrepreneurship
- Factors affecting entrepreneurship

Session (3)
- Key characteristics of successful entrepreneurs
- Qualities of an entrepreneur
- Common challenges faced by entrepreneurs

Session (4)
- How to overcome their challenges
- Key Elements of a Successful Entrepreneurship Ecosystem
- Entrepreneurship - Challenges and Solutions

- Entrepreneurship training program was implemented; the nurses were divided into small groups (Each group consists of a number of nurses according to availability and workload for conducting the training.

- Different methods of teaching were used as brainstorming, lectures, videos, discussion and handout that are prepared by the researcher and distributed to the participants.

- Immediately after completion of the training program the three tools of data collection was distributed to the participants. The researcher started to follow up the proposed progress after training program through comparison of post test results with the baseline finding obtained in the pretest assessment by using the same three tools of data collection.

Data Analysis:

The collected data were coded, entered, tabulated and analyzed using SPSS (Statistical Package for Social Science) version 25 (IBM Corporation, Armonk, NY, USA). For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, which describe a categorical set of data by frequency, percentage or proportion of each category, comparison between two groups and more was done using Chi-square test (χ^2). For comparison between more than two means of non-parametric data of related samples (Before, immediate after and three months after follow up of the training program), Friedman test was used and (x^2 value) was calculated. For comparison

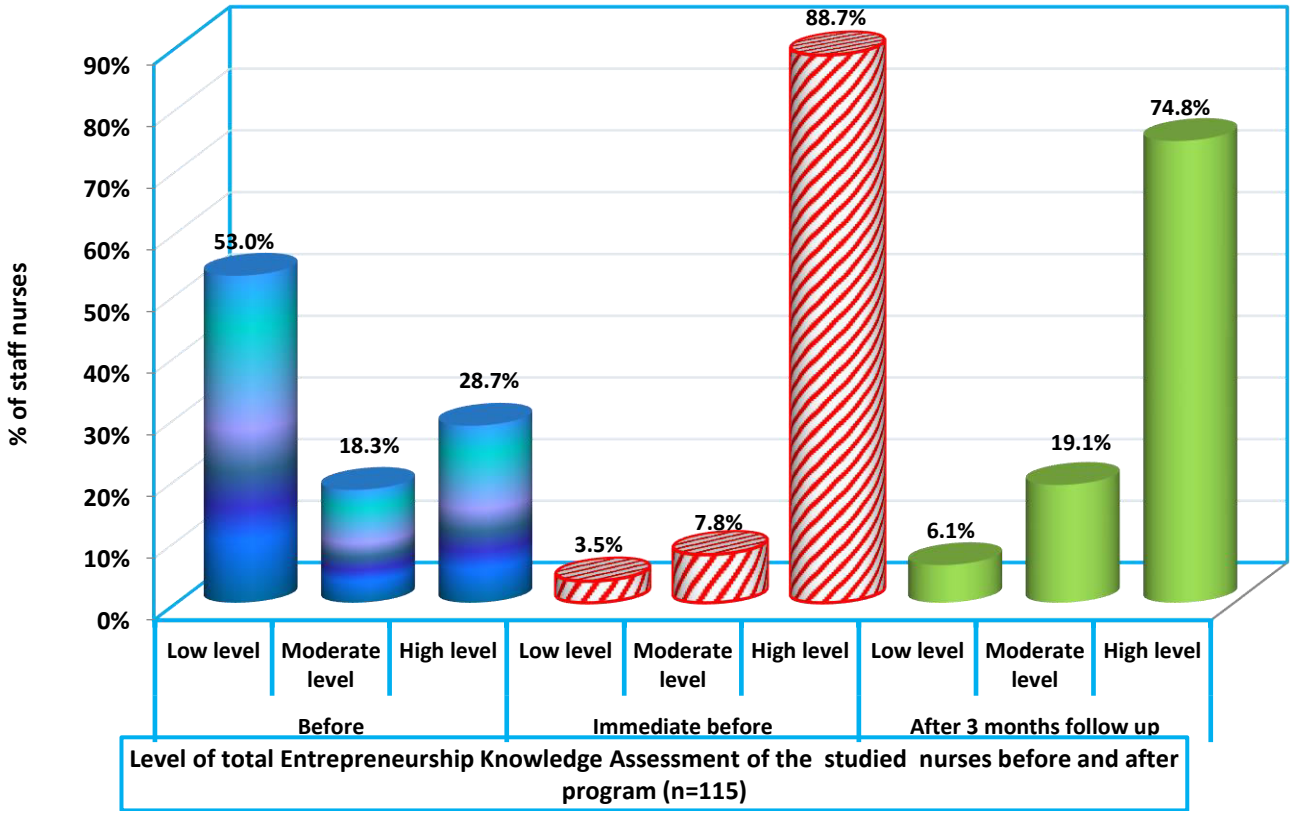
between more than two means of non-parametric data of related samples (Before, immediate after and three months after follow up of the training program), Friedman test (χ^2 value) was calculated. For comparison between means of two groups of non-parametric data of independent samples, Z value of Mann-whitney test was used. For comparison between more than two means of non-parametric data, Kruskal-Wallis test was used and (χ^2) value was calculated. Correlation between variables was evaluated using Pearson's correlation coefficient (r).

Results:

Table (1): Personal characteristics of the studied staff nurses at King Khalid Hospital in Hail, Saudi Arabia.

Personal characteristics	The studied staff nurses (n=115)	
	n	%
▪**Age years**		
20-<30	28	24.3
30-40	80	69.6
>40	7	6.1
Mean±SD	36.44±7.04	
▪**Sex**		
Male	41	35.7
Female	74	64.3
▪ **Marital Status**		
Single	41	35.7
Married	68	59.1
Divorced	2	1.7
Widow	4	3.5
▪**Experience years**		
1-5	25	21.7
>5-10	6	5.2
>10	84	73.0
Mean±SD	11.66±6.12	
▪ **Educational qualification**		
Diploma	11	9.6
Bachelor	101	87.8
Master degree	3	2.6

Table (1) presents the personal characteristics of 115 staff nurses at King Khalid Hospital in Hail, Saudi Arabia. The majority of participants were aged 30-40 years (69.6%) with a mean age of 36.44±7.04 years, while only 6.1% were over 40 years old. Regarding gender distribution, females predominated at 64.3% compared to males at 35.7%. Most nurses were married (59.1%), followed by single nurses (35.7%), with minimal representation of divorced (1.7%) and widowed (3.5%) participants. In terms o89/f professional experience, the largest proportion had more than 10 years of experience (73.0%), with a mean of 11.66±6.12 years, while only 5.2% had 5-10 years of experience. Educational qualifications showed that the vast majority held a Bachelor's degree (87.8%).



Figures (1) illustrate the level of Entrepreneurship Knowledge Assessment among the studied staff nurses before and after implementing the Training Program. For True/False knowledge questions, the percentage of nurses with high knowledge level (12-15 points) increased dramatically from 38.3% before training to 90.4% immediately after, and remained elevated at 80.9% at 3 months (x^2 = 103.319, P = 0.0001). Conversely, the low knowledge level decreased from 40.9% to only 2.6% at follow-up. For MCQs, high knowledge level increased from 28.7% before training to 84.3% immediately after, declining slightly to 61.7% at 3 months (x^2 = 98.625, P = 0.0001). The

total Entrepreneurship Knowledge Assessment level showed the most striking transformation: high knowledge level surged from 28.7% pre-training to 88.7% immediately post-training, and maintained at 74.8% after 3 months, while low knowledge level plummeted from 53.0% to only 6.1% (x^2 = 127.200, P = 0.0001).

Table (2): Total Entrepreneurial Intention score and level among the studied staff nurses at King Khalid Hospital in Hail, Saudi Arabia before and after implementing Entrepreneurship Training Program.

Total Entrepreneurial Intention (Each item was scored 1-5)	Total Entrepreneurial Intention among the studied staff nurses before and after implementing training program (n=115)						x ² test P value
	Before		Immediate after		After 3 months follow up		
	n	%	n	%	n	%	
• Total Entrepreneurial Intention level							
Low level (6-17)	76	66.1	37	32.2	49	42.6	47.813
Moderate level (18-22)	34	29.6	31	27.0	36	31.3	0.006*
High level (23-30)	5	4.3	47	40.9	30	26.1	
•Total Entrepreneurial Intention scores (6-30)							
Range	6-30		6-30		6-30		
Mean±SD	14.49±5.46		20.68±5.84		18.23±6.18		
x ² value	55.465						
P value	0.0001*						

Table (2) display the total Entrepreneurial Intention score and level among the studied staff nurses before and after implementing the Entrepreneurship Training Program. Before the training, the majority of nurses (66.1%) had low entrepreneurial intention levels (6-17 points), with a mean score of 14.49±5.46. Only 4.3% demonstrated high intention levels (23-30 points). Immediately after the program, there was a remarkable transformation, with high intention levels

increasing to 40.9% and the mean score rising significantly to 20.68±5.84. Low intention levels decreased substantially to 32.2%. At the 3-month follow-up, while high intention levels decreased slightly to 26.1%, they remained significantly higher than baseline, with a mean score of 18.23±6.18. The chi-square analysis confirmed these changes were statistically significant (x^2 = 47.813, P = 0.006 for levels; x^2 = 55.465, P = 0.0001 for scores).

Table (3): Total perceived Professional Identity score and level among the studied staff nurses at King Khalid Hospital in Hail, Saudi Arabia before and after implementing Entrepreneurship Training Program.

Total perceived Professional Identity (Each item was scored 1-5)	Total perceived Professional Identity among the studied staff nurses before and after implementing Training Program (n=115)						x ² test P value
	Before		Immediate after		After 3 months follow up		
	n	%	n	%	n	%	
•Total perceived Professional Identity level							
Low level (24-71)	69	60.0	17	14.8	40	34.8	55.951
Moderate level (72-91)	26	22.6	35	30.4	33	28.7	0.0001 *
High level (92-120)	20	17.4	63	45.8	42	36.5	
•Total perceived Professional Identity scores (24-120)							
Range	24-120		24-120		24-120		
Mean±SD	64.65±22.44		91.32±22.24		81.03±26.12		
x ² value	66.437						
P value	0.0001*						

***Statistically significant (P<0.05)**

Table (3) present the total perceived Professional Identity score and level among the studied staff nurses before and after implementing the Entrepreneurship Training Program. Before the training, the majority of nurses (60.0%) had low professional identity perception (24-71

points), with only 17.4% demonstrating high perception levels (92-120 points) and a mean score of 64.65±22.44. Immediately after the program implementation, there was a remarkable shift, with high perception levels increasing to 45.8% (should be 54.8% based on 63 out of 115) and the mean score rising substantially to 91.32±22.24, while low perception levels decreased dramatically to 14.8%. At the 3-month follow-up, high perception levels remained elevated at 36.5%, with a mean score of 81.03±26.12, though some decline from immediate post-training levels was observed. The chi-square analysis confirmed these changes were highly statistically significant (x^2 = 55.951, P = 0.0001 for levels; x^2 = 66.437, P = 0.0001 for scores).

Table (4): Correlation between total scores of Entrepreneurship Knowledge Assessment and Entrepreneurial Intention and perceived Professional Identity among the studied staff nurses at King Khalid Hospital in Hail, Saudi Arabia before and after implementing Entrepreneurship Training Program.

Variables	Total Entrepreneurship Knowledge Assessment scores of the studied staff nurses before and after program (n=115)					
	Before		Immediate after		After 3 months follow up	
	r	P value	r	P value	r	P value
Total Entrepreneurial Intention scores	0.285	0.002*	0.371	0.0001*	0.323	0.0001*
Total perceived Professional Identity scores	0.335	0.0001*	0.436	0.0001*	0.378	0.0001*

***Statistically significant (P<0.05)**
r=Correlation Coefficient

Table (4) present the correlation between total scores of Entrepreneurship Knowledge Assessment, Entrepreneurial Intention, and perceived Professional Identity among the studied staff nurses before and after implementing the Entrepreneurship Training Program. The correlation between total Entrepreneurship Knowledge Assessment scores and Entrepreneurial Intention scores showed a positive significant relationship at all time points: before training (r = 0.285, P = 0.002), immediately after (r = 0.371, P = 0.0001), and at 3-month follow-up (r = 0.323, P = 0.0001), with the strongest correlation observed

immediately post-training. Similarly, the correlation between Entrepreneurship Knowledge Assessment and Professional Identity scores demonstrated consistently positive significant relationships: before (r = 0.335, P = 0.0001), immediately after (r = 0.436, P = 0.0001), and at 3 months (r = 0.378, P = 0.0001).

Table (5): Correlation between total scores of Entrepreneurial Intention scores and perceived Professional Identity scores among the studied staff nurses at King Khalid Hospital in Hail, Saudi Arabia before and after implementing Entrepreneurship Training Program.

Variable	Total Entrepreneurial Intention scores of the studied staff nurses before and after program (n=115)					
	Before		Immediate after		After 3 months follow up	
	r	P value	r	P value	r	P value
Total perceived Professional Identity scores	0.438	0.0001*	0.399	0.0001*	0.511	0.0001*

***Statistically significant (P<0.05)**
r=Correlation Coefficient

Table (5) display the correlation between total scores of Entrepreneurial Intention and perceived Professional Identity among the studied staff nurses before and after implementing the Entrepreneurship Training Program. The correlation analysis revealed consistently positive and statistically significant relationships at all assessment periods: before training (r = 0.438, P = 0.0001), immediately after training (r = 0.399, P = 0.0001), and at the 3-month follow-up (r = 0.511, P = 0.0001). Notably, the correlation coefficient was strongest at the 3-month follow-up (r = 0.511), indicating that the relationship between entrepreneurial intention and professional identity became stronger over time.

Discussion

As healthcare environments become more complex and resource-constrained, entrepreneurship equips nurses with the skills needed to adapt, lead change, and respond proactively to emerging health needs. Entrepreneurship for nurses refers to the ability of nurses to identify

opportunities, develop innovative solutions, and create value within healthcare systems through new services, practices, or models of care. It extends beyond business ownership to include intrapreneurship, leadership, and innovation in clinical, educational, and community settings. Entrepreneurial nurses contribute to improving care quality, efficiency, and accessibility by applying creativity, risk-taking, and strategic thinking while maintaining professional and ethical standardsLi, Cao, & Jenatabadi (2023).

Professional identity in nursing is the internalized set of values, beliefs, knowledge, and roles that define how nurses perceive themselves and their profession. It develops through education, clinical experiences, socialization, and reflection, shaping nurses' commitment to ethical practice, accountability, and lifelong learning. A strong professional identity supports confidence, autonomy, and a sense of purpose, enabling nurses to perform effectively and advocate for patients and the profession. It also influences career satisfaction, resilience, and retention, particularly in demanding healthcare environments (Zhang, Peng, Dong, Hou, & Chen 2023).

Entrepreneurship and professional identity in nursing are closely interconnected, as a strong professional identity provides the foundation for entrepreneurial behaviors, while entrepreneurship reinforces and expands nurses' professional roles. Nurses who possess a well-developed professional identity are more likely to view innovation and leadership as integral to their professional responsibilities rather than as deviations from traditional practice. Conversely, engaging in entrepreneurial activities strengthens professional identity by enhancing autonomy, self-efficacy, and recognition of nursing's impact on healthcare transformation (Lantu et al., 2022), Together, these study aimed to evaluate the effect of entrepreneurship training program for nurses and its effect on professional identity at King Khalid Hospital in Hail, Saudi Arabia

The current study demonstrates a clear improvement in the level of Entrepreneurship Knowledge Assessment among the studied staff nurses following implementation of the training program. For True/False questions, the proportion of nurses with a high level of knowledge increased markedly immediately after the program and remained high at follow-up, while the proportion with a low level of knowledge showed a substantial reduction. A similar pattern was observed for multiple-choice questions, where high knowledge levels increased after the intervention and were maintained, though with some decline, at follow-up. Overall, the total Entrepreneurship Knowledge Assessment level showed a pronounced shift from predominantly low knowledge before the program to predominantly

high knowledge after implementation, with this improvement sustained over time. Statistically significant differences were observed across all assessment periods.

This may be attributed to the structured design of the training program, which ensured comprehensive and sequential coverage of entrepreneurship knowledge. The use of organized educational materials facilitated clearer understanding of key concepts among staff nurses. Repeated exposure to the content supported consolidation of learning immediately after the program. Ongoing reinforcement contributed to sustaining knowledge over time. Collectively, these elements enhanced overall knowledge acquisition and retention.

In alignment with the current study findings, Liao, Nguyen, & Caputo (2022), who studied the role of entrepreneurial knowledge and cognition as antecedents of entrepreneurial intention through a comprehensive meta-analytic approach, reported that entrepreneurial knowledge is a significant and robust predictor of improved entrepreneurial outcomes. Their results demonstrated that increased exposure to structured entrepreneurial knowledge significantly enhances individuals' cognitive readiness and entrepreneurial capabilities, supporting the present study's observed shift from low to high levels of entrepreneurship knowledge following the training program.

Along with these findings, Malakoti et al., (2023), who studied entrepreneurship in nursing with a focus on challenges, opportunities, and barriers, emphasized that educational and training initiatives are essential for improving nurses' entrepreneurial knowledge and competencies. Their overview highlighted that nurses who receive targeted entrepreneurship education demonstrate higher levels of awareness, understanding, and readiness for entrepreneurial roles, which is consistent with the sustained improvement in knowledge levels reported in the current study after program implementation.

In agreement with the present results, Eid & Ebrahim (2023), who studied the effect of an entrepreneurship education program on nursing interns' motivation, found statistically significant improvements in entrepreneurial-related knowledge and motivation after program implementation. Their study indicated that structured educational interventions play a critical role in elevating entrepreneurship-related outcomes among nursing populations, reinforcing the current study's findings of statistically significant differences across all post-intervention assessment periods.

As well as this, Backes et al., (2022), who studied social entrepreneurship within professional nursing training, reported that integrating entrepreneurship concepts into nursing education positively influences nurses' knowledge, skills, and professional perspectives. Their findings demonstrated that educational exposure leads to a deeper understanding of entrepreneurial practices in healthcare, which aligns with the pronounced improvement and sustained knowledge gains observed among staff nurses in the current study.

The current study reveals a notable change in the total entrepreneurial intention level and score among the studied staff nurses following implementation of the entrepreneurship training program. Prior to the intervention, most nurses demonstrated a low level of entrepreneurial intention, with only a small proportion exhibiting a high level. Immediately after the program, a clear shift toward higher entrepreneurial intention was observed, accompanied by a marked reduction in low intention levels. At the follow-up period, although there was a slight decline in high intention levels compared with the immediate post-program assessment, entrepreneurial intention remained higher than the pre-training level. These differences across the assessment periods were statistically significant.

This may be explained by the comprehensive structure of the entrepreneurship training program, which increased nurses' exposure to entrepreneurial concepts and practices. The program enhanced understanding of the value and feasibility of entrepreneurial activities within nursing roles. Active learning strategies supported engagement and internalization of key ideas. Reinforcement of content immediately after training strengthened intention formation. Continued exposure and reflection contributed to maintaining entrepreneurial intention over time.

In alignment with the current results, Alakaleek, Harb, & Harb (2023), who studied the impact of entrepreneurship education on entrepreneurial outcomes, reported that structured entrepreneurship education significantly improves participants' entrepreneurial intention, mindset, and readiness to engage in innovative activities. Their findings demonstrated a clear shift from low to moderate or high entrepreneurial intention following educational interventions, which supports the current study's observation of a notable improvement in entrepreneurial intention levels among staff nurses after implementation of the entrepreneurship training program.

Along with these findings, Li, Cao, & Jenatabadi (2023), who studied the effect of entrepreneurial education and creativity on entrepreneurial intention among college students, found that entrepreneurship education positively influences entrepreneurial intention through mediating factors such as entrepreneurial mindset, inspiration, and self-efficacy. Their results indicated that post-intervention participants showed significantly higher intention scores compared to pre-intervention levels, which is in agreement with the present study's finding that most nurses initially demonstrated low entrepreneurial intention that improved immediately after the program.

In agreement with the current study, Lantu et al., (2022), who studied the role of experiential learning models in improving entrepreneurial values through internships at start-ups, concluded that hands-on and structured entrepreneurial learning experiences lead to meaningful improvements in entrepreneurial attitudes and intentions. Their study emphasized that exposure to practical entrepreneurial concepts produces measurable changes in participants' motivation and intention, supporting the effectiveness of the entrepreneurship training program used in the current study to elevate nurses' entrepreneurial intention levels.

As well as supporting the present findings, Larsen (2022), who studied instructional strategies for fostering an entrepreneurial mindset, reported that targeted educational strategies aligned with entrepreneurial mindset frameworks significantly enhance learners' entrepreneurial thinking and intention. This aligns with the observed post-program increase in entrepreneurial intention scores among staff nurses, highlighting the role of well-designed educational content in shifting intention levels from low to higher categories.

The current study displayed the level of perceived Professional Identity dimensions among the studied staff nurses before and after implementing the Entrepreneurship Training Program. For the Interprofessional belonging dimension, the percentage of nurses with high perception levels increased immediately after training and remained elevated at three months, while low levels decreased across both post-training measurements. The Interprofessional commitment dimension showed improvement, with high levels rising immediately post-training and sustained at follow-up, while low levels decreased correspondingly. The Interprofessional beliefs dimension demonstrated transformation, with high perception levels increasing immediately after training and remaining elevated at three months, while low levels

dropped significantly. All three dimensions showed statistically significant differences across the measurement timepoints.

This may be attributed to the Entrepreneurship Training Program's comprehensive approach to developing interprofessional competencies and professional identity among staff nurses. The program's effectiveness in producing immediate improvements across all three dimensions—belonging, commitment, and beliefs—that persisted at three-month follow-up demonstrates its capacity to create lasting transformation in how nurses perceive themselves professionally and their role within interprofessional teams. By integrating entrepreneurial thinking with professional development, the intervention empowered nurses as active contributors and decision-makers, strengthening both their commitment to practice and confidence in collaborative engagement.

The current findings are supported by Yi, Zhou, Ma, Yang, Wang, & Wu (2024), who conducted a study examining the mediating role of psychological resilience in the relationship between self-efficacy and professional identity among nurses. Their research found that enhancing self-efficacy through targeted interventions strengthens professional identity, which aligns with the current study's demonstration that the Entrepreneurship Training Program significantly improved all three professional identity dimensions immediately post-training and sustained improvements at three-month follow-up.

In alignment with the current results, Hanum, Hu, Wei, Zhou, & Ma (2023) conducted research on professional identity, job satisfaction, and intention to stay among clinical nurses during the prolonged COVID-19 pandemic. They found that professional identity development positively influenced nurses' work engagement and retention, supporting the current study's evidence that structured training programs can elevate professional identity perceptions across interprofessional belonging, commitment, and beliefs dimensions.

Along with these findings, Zhang, Peng, Dong, Hou, & Chen (2023) investigated professional identity and sense of coherence among Chinese hospital nurses and their effects on compassion fatigue and work engagement. Their findings demonstrated that stronger professional identity was associated with improved workplace outcomes, which corroborates the current study's observation of significant increases in high perception levels across all three dimensions immediately post-intervention.

The current study demonstrates a significant relationship between the total level of entrepreneurship knowledge assessment and entrepreneurial intention among the studied staff nurses across all

assessment periods. Before implementation of the training program, nurses with lower levels of knowledge were predominantly characterized by low entrepreneurial intention, whereas those with higher knowledge levels showed higher entrepreneurial intention. Immediately after the program, nurses who attained high knowledge levels were more likely to demonstrate higher entrepreneurial intention, with a concurrent reduction in low intention levels. At the follow-up period, this association remained evident, indicating a consistent relationship between higher knowledge levels and stronger entrepreneurial intention.

This may be explained by the close linkage between knowledge acquisition and intention formation in entrepreneurial behavior. Increased understanding of entrepreneurship concepts enhanced nurses' ability to recognize opportunities and potential benefits. Improved knowledge supported confidence in engaging with entrepreneurial ideas. Reinforcement of learning through the training program strengthened the alignment between knowledge and intention. Sustained knowledge retention contributed to maintaining this relationship over time.

In alignment with the current findings, Mohamed (2024), who studied nurses' knowledge and skills regarding entrepreneurship, reported a statistically significant positive relationship between nurses' entrepreneurship knowledge levels and their entrepreneurial intentions. The study revealed that nurses with higher knowledge scores demonstrated stronger entrepreneurial intention, whereas those with lower knowledge levels exhibited weaker intention. These findings support the current study, particularly the pre-implementation observation that lower knowledge levels were associated with low entrepreneurial intention.

The current study demonstrated the relationship between total level of Entrepreneurship Knowledge Assessment and perceived Professional Identity among the studied staff nurses before and after implementing the Entrepreneurship Training Program. At pretest, among nurses with low knowledge levels, the majority had low professional identity perception, while among those with high knowledge, more than half had high professional identity and a smaller proportion had low perception. Immediately after training, among nurses with high knowledge, more than half demonstrated high professional identity perception and a notable proportion had moderate perception, while nurses with low knowledge had low professional identity. At the three-month follow-up, the relationship remained strong, with high-knowledge nurses showing elevated professional identity, though notably, nurses with moderate knowledge had low

professional identity. The chi-square analysis confirmed the relationship between entrepreneurship knowledge and professional identity was highly statistically significant across all measurement timepoints.

This may be explained by the foundational role of entrepreneurship knowledge in shaping professional identity development among nursing staff. The strong positive relationship between higher entrepreneurship knowledge levels and elevated professional identity perception demonstrates that acquisition of entrepreneurial competencies directly influences how nurses conceptualize their professional roles and self-perception. The sustained relationship at three-month follow-up indicates that entrepreneurship knowledge creates lasting cognitive shifts in professional identity, serving as a durable foundation for maintaining strengthened self-perception. The consistent pattern across measurement timepoints suggests that entrepreneurship knowledge and professional identity are interconnected constructs, with enhanced knowledge fostering a stronger sense of professional purpose, capability, and identity among nursing staff.

The current findings are supported by Neergård & Aadland (2025), who conducted research on embracing an entrepreneurial identity through entrepreneurial learning from a dual-identity perspective. Their work found that entrepreneurial learning directly facilitates the development and strengthening of entrepreneurial identity, which aligns with the current study's demonstration that higher levels of entrepreneurship knowledge are strongly associated with elevated professional identity perception among nursing staff.

Conclusion

Based on the study findings, it was concluded that implementing an entrepreneurship training program produced statistically significant improvements in staff nurses' entrepreneurship knowledge, entrepreneurial intention, and perceived professional identity across different phases of the training program, furthermore, a strong positive correlation was established among the three constructs, indicating that enhanced entrepreneurship knowledge reinforces entrepreneurial intention and elevates professional identity.

Recommendations

For Hospital Administrators:

- Collaborate with nursing schools to introduce entrepreneurship modules within undergraduate and postgraduate nursing

curricula, establishing the foundation before nurses enter the workforce.

- Adopt and institutionalize entrepreneurship training programs as a mandatory component of nurses' continuing professional development curricula.
- Allocate dedicated resources including time, funding, and educational materials to support the regular delivery of entrepreneurship training across all nursing departments.

For Head Nurses

- Integrate entrepreneurship concepts into regular unit-based training sessions and staff meetings to reinforce and sustain the knowledge gained.
- Identify and mentor nurses who demonstrate high entrepreneurial intention, guiding them toward innovation projects and quality improvement initiatives within their units.

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