



## Research article

# The effect of nursing students' attitudes towards scientific research and related factors on individual innovativeness profiles

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## ABSTRACT

**Background:** Evaluating the attitudes of nursing students towards scientific research is pivotal for enhancing the quality of care and reinforcing evidence-based nursing practices. Therefore, nursing students to embody a disposition towards openness to cultivate innovative thinking to effectively discern and address the evolving needs within nursing care services.

**Aim:** This study was conducted to determine the effects of nursing students' attitudes towards scientific research and related factors on their individual innovation profiles.

**Methods:** A total of 375 nursing students were included in the study. The data were collected using a Demographic Information Form, Individual Innovativeness Scale and Attitude towards Scientific Research Scale. For between-group comparisons, the student *t*-test and One-way ANOVA were utilized for normally distributed data, whereas the Mann-Whitney U and Kruskal-Wallis tests were applied for non-normally distributed data. Linear regression analysis was employed to predict the individual innovativeness profiles of nursing students based on their attitudes towards scientific research and associated factors.

**Results:** According to the model created as a result of linear regression analysis, nursing students' attitudes towards scientific research and associated factors elucidate 22.9 % of the variance in individual innovativeness profiles. In this study, it was discerned that participants with elevated computer skills, a sense of competence in research conduct, a proclivity for engaging in scientific research, and a penchant for monitoring Turkish publications exhibited higher mean scores in the Individual Innovativeness Scale.

**Conclusion:** This study established that nursing students' attitudes towards scientific research and associated factors possessed predictive capacity for individual innovativeness profiles.

## 1. Introduction

Over the past century, rapid advancements and transformations have characterized the landscape of science and technology. Scientific inquiry stands out as the foremost catalyst for progress in the realm of science. Scientific research, encompassing deliberate endeavors for knowledge generation, involves the systematic identification of a problem within a specific subject, strategic planning, meticulous implementation, subsequent finalization, and comprehensive evaluation of the acquired results (Barker et al., 2015). The objective of scientific research within the field of nursing is to propel theoretical knowledge forward, concurrently fostering a robust scientific foundation for the enhancement of nursing skills. According to the International Council of Nurses (ICN), scientific research serves as the fundamental underpinning for progress within the

nursing profession (International Council of Nurses, 2020). Furthermore, it is underscored that nurses and nursing students should undergo systematic instruction in scientific research methodologies to cultivate the capacity for developing, implementing, and critically appraising scientific research endeavors.

Through undergraduate education, nursing students acquire the requisite skills, values, and inquiry aptitudes essential for the nursing profession. Consequently, fostering a researcher identity in undergraduate education becomes imperative, as it constitutes the foundational stage where fundamental perspectives and research-related skills are cultivated (Ferguson et al., 2016). Evaluating the attitudes of nursing students towards scientific research is pivotal for enhancing the quality of care and reinforcing evidence-based nursing practices. Upon reviewing existing literature on the subject, it is evident that nursing

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students generally exhibit positive attitudes towards engagement in scientific research (Gürdoğan et al., 2021; Halabi, 2016; Ünver et al., 2018; Uysal Toraman et al., 2017). It is imperative for nursing students to comprehend the significance of scientific research in both the scientific domain and broader societal context, recognizing its substantial contribution to the advancement of nursing practice.

Nurses actively engaged in health protection, promotion, treatment, care, and rehabilitation processes should remain vigilant in monitoring the ongoing changes, developments, and innovations associated with these processes (Arslan and Şener, 2012). It is essential for nurses and nursing students to embody a disposition towards openness to innovation and cultivate innovative thinking to effectively discern and address the evolving needs within nursing care services. Consequently, they ought to refrain from resistance to innovative approaches, actively engage in thoughtful ideation and implementation of innovations, and proficiently leverage their innovative roles (International Council of Nurses, 2009). In response to advancements in technological and scientific research, numerous innovative practices have emerged within the field of nursing. Evolutionary changes, including the proliferation of evidence-based nursing, accreditation processes, the integration of simulation models to translate theoretical knowledge into practical skills, and endeavors to establish standardization in healthcare services, represent progressive innovations in recent years. These practices contribute to the enhancement of critical thinking and decision-making skills among nurses while addressing the demand for skilled personnel in the field (Dil et al., 2012; Özbey and Başdaş, 2018). Within the literature, it is asserted that nursing students predominantly apply acquired knowledge from their education, display hesitance in embracing innovative practices, and tend to avoid engaging in discussions that involve risk-taking (Erol et al., 2018; Ertuğ et al., 2017; Kalisch and Begeny, 2010; Utli and Vural Doğru, 2018). In an alternative study, findings indicated that nursing students exhibit diminished levels of innovativeness and manifest a proclivity towards questioning tendencies concerning innovations (Bodur, 2018). The cultivation of innovative nursing professionals is envisioned through the integration of an innovation-centric framework in nursing education. To achieve this objective, it is imperative that nursing instructors demonstrate receptivity to innovation and actively engage in the systematic reassessment of the nursing curriculum (Dil et al., 2012; International Council of Nurses, 2009).

Systematic initiatives and practices are implemented to enhance the knowledge and skills of nurses in the realm of healthcare, augment the quantity of proficient individuals within the field, and cultivate innovative professionals who demonstrate a proclivity for accessing scientific knowledge. Numerous studies in the literature examine nursing students' attitudes towards scientific research (Ertuğ et al., 2017; Gürdoğan et al., 2021; Halabi, 2016; Halabi and Hamdan-Mansour, 2010; Toraman et al., 2013; Ünver et al., 2018; Uysal Toraman et al., 2017). Additionally, the literature includes studies that examine individual innovativeness profiles and barriers to innovation (Bodur, 2018; Dil et al., 2012; Erol et al., 2018; Ertuğ et al., 2017; Kalisch and Begeny, 2010; Utli and Vural Doğru, 2018). However, there are no studies that examine these two variables together. For this reason, this study is the first to determine the effects of nursing students' attitudes towards scientific research and related factors on their individual innovation profiles. It is thought that determining the relationship between innovation profile and attitudes towards scientific research will contribute to the planning of interventions to increase students' innovation profile and shed light on nursing educators. With this study, it is thought that nursing students who are supported to develop positive attitudes towards scientific research may be predisposed to show an innovative profile and may contribute to the adoption of the use of technological devices in hospitals, easier integration of these devices into patient care, increasing evidence-based practices, increasing the quality of health care and more efficient execution of patient processes.

## 2. Methods

### 2.1. Aim

This study was conducted to determine the effects of nursing students' attitudes towards scientific research and related factors on their individual innovation profiles.

### 2.2. Design

In this study, a cross-sectional study design has been adopted. The study's transparency is enhanced through the use of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist (von Elm et al., 2007).

### 2.3. Participants

The study population comprises 567 students enrolled in the Nursing Department of a university during the fall semester of 2023–2024. The necessary sample size calculation for the study calculated 325 individuals, conducted using GPOWER 3.1 statistical analysis software (Faul et al., 2007). This calculation was based on a significance level of 0.05, a power of 80 %, and an effect size of 0.03, considering two variables for multivariate linear regression analysis. It was initially determined that a sample size of 325 students would be sufficient based on the adapted power analysis. However, considering the possibility of incomplete or incorrectly filled surveys, and potential attrition, a total of 375 students were included in the study. The sample group was reached using random sampling method. The inclusion criteria were that students were 1) currently enrolled as nursing students and 2) willing to participate in the study.

### 2.4. Instruments

The data were collected using a Demographic Information Form, Individual Innovativeness Scale (IIS), and Attitude towards Scientific Research Scale (ASRS).

**Demographic Information Form:** The questionnaire was created by researchers based on a review of the literature. It comprises 18 questions designed to capture sociodemographic information, such as age, gender, and high school education, along with variables that may influence participants' levels of innovativeness and attitudes towards scientific research (Aktaş and Sançar, 2021; Aydın et al., 2015; Çağlar et al., 2020; Furaikh et al., 2017; Karadaş and Özdemir, 2015; Kes and Şahin, 2019; Korkmaz et al., 2011; Ryan, 2016; Toraman et al., 2013; Yılmaz et al., 2020).

**Individual Innovativeness Scale (IIS):** The five-point Likert scale was originally developed by Hurt et al. and subsequently adapted into Turkish by Kilicer and Odabasi, with validity and reliability analyses performed (Hurt et al., 1977; Kılıçer and Ferhan Odabaşı, 2010). The total score that can be obtained from the scale ranges from 14 to 94. According to the total score, students are categorized as follows: *Innovators* for scores above 80, *Early Adopters* for scores between 69 and 80, *Early Majority* for scores between 57 and 68, *Late Majority* for scores between 46 and 56, and *Laggards* for scores below 46. The Cronbach's alpha coefficient for the original scale and the adapted Turkish version were 0.89 and 0.82, respectively. In our study, the Cronbach's alpha coefficient for the scale was determined to be 0.79.

**Attitude towards Scientific Research Scale (ASRS):** The scale, developed by Korkmaz et al. (2011), consists of 30 items in a 5-point Likert type. It comprises four subscales: Negative attitude towards scientific research, reluctance to assist researchers, positive attitude towards scientific research, and positive attitude towards researchers. An increase in the scores obtained in response to the scale indicates an increase in attitude. The first two subscales are inversely proportional to the last two subscales. All items in the first and second subscales are negative

statements, while the statements in the third and fourth subscales are positive. Therefore, high scores obtained from the first two subscales indicate negativity, while high scores in the third and fourth subscales indicate positivity. A minimum of 54 points and a maximum of 150 points can be obtained from the scale. The Cronbach's alpha coefficients for the original scale's subscales were found to be 0.85, 0.81, 0.80, and 0.76, respectively (Korkmaz et al., 2011). In our study, the Cronbach's alpha coefficients for the subscales of the scale were determined to be 0.82, 0.84, 0.84, and 0.88, respectively.

2.5. Data collection

The data for the study were gathered in face-to-face sessions from students who met the inclusion criteria between October 2023 and January 2024. The data were collected after the participants who attended the class at the time of data collection from each class and volunteered were informed about the study until the number determined in the sample calculation was reached. The completion of data collection forms took approximately 10 min on average.

2.6. Data analysis

The descriptive data were expressed using number (n), percentage (%), mean, and standard deviation (SD). For between-group comparisons, the student *t*-test and One-way ANOVA were utilized for normally distributed data, whereas the Mann-Whitney U and Kruskal-Wallis tests were applied for non-normally distributed data. To assess the normality of the data distribution, the Kolmogorov-Smirnov test was employed. In multiple group assessments, if the *p*-value is <0.05, Bonferroni-adjusted Mann-Whitney U Test was conducted as a post-hoc test to determine the source of differences among which group(s) (Field, 2013; Grove, 2007). Linear regression analysis was employed to predict the individual innovativeness profiles of nursing students based on their attitudes towards scientific research and associated factors. In determining which independent variables to include in the model (to assess multicollinearity), tolerance, VIF (variance inflation factor), and condition index values were utilized. Independent variables with a VIF value of <10, tolerance value of >0.2, and condition index value of <15 were included in the regression analysis (Su et al., 2012). A statistical significance level of 0.05 was accepted.

2.7. Ethical considerations

The study was conducted with ethical approval from the Scientific Research and Publication Ethics Committee of a university, as well as research implementation permission from the nursing department. Verbal and written consent were obtained from students who met the inclusion criteria. The research process was conducted in accordance with the Helsinki Declaration.

3. Results

The mean age of the participants was 20.75 ± 2.11 and 67.70 % of the participants were female. 92 % of the participants graduated from high schools other than those specializing in health sciences. 18.90 % defined their foreign language proficiency level as adequate, while 31.20 % defined their computer proficiency level as adequate. 44.50 % of the students stated that they have taken biostatistics and research methods courses. The sociodemographic characteristics of the participants and variables related to scientific research was presented in Table 1.

The results of participants' ASRS subscales and IIS scores are presented in Table 2. The participants' IIS scores were determined to have a mean of 64.00 ± 8.20. According to the IIS, the distribution of innovativeness characteristics is as follows: 2.40 % were classified as "Innovators," 24.50 % as "Early Adopters," 57.30 % as "Early Majority,"

Table 1

The sociodemographic characteristics of the participants and variables related to scientific research.

n:375	Mean ± Standard Deviation	Minimum-Maximum
Age	20.75 ± 2.11	18–36
Gender	n	%
Female	254	67.70
Male	121	32.30
Class		
1st	90	24.00
2nd	101	26.90
3rd	94	25.10
4th	90	24.00
Graduated high school		
Health vocational school	30	8.00
Others	345	92.00
Foreign language proficiency level		
Adequate	71	18.90
Undecided	93	24.80
Inadequate	211	56.30
Computer proficiency level		
Adequate	117	31.20
Undecided	139	37.10
Inadequate	119	31.70
Previous biostatistics and research course taking status		
Yes	167	44.50
No	208	55.50
Evaluation of competence in conducting scientific research		
Competent enough	69	18.40
Undecided	217	57.90
Inadequate	89	23.70
Previous involvement in any scientific research process		
Yes	88	23.50
No	287	76.50
Being interested in taking part in the scientific research process		
Yes	212	56.50
No	163	43.50
Status of following Turkish professional periodicals (books, articles, etc.)		
Yes	118	31.50
No	257	68.50
Status of following English professional periodicals (books, articles, etc.)		
Yes	39	10.40
No	336	89.60
Frequency of reading scientific publications in the field of nursing		
Never	102	27.20
Sometimes	254	67.70
Frequently	17	4.50
Always	2	0.50
Status of benefiting from the information read in scientific publications while providing nursing care in clinical practice		
Yes	234	62.40
No	141	37.60
Status of planning to get postgraduate education		
Yes	230	61.30
No	145	38.70
Phase of scientific research in which* (N:163)		
Subject determination	28	17.18
Literature review	31	19.02
Planning	28	17.18
Data collection	39	23.93
Data analysis	13	7.97
Reporting and presentation	24	14.72
Reasons for not wanting to take part in the scientific research process* (N: 221)		

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Table 1 (continued)

n:375	Mean ± Standard Deviation	Minimum-Maximum
Lack of available time	103	46.61
Lack of knowledge about scientific research	43	19.46
Lack of financial resources	24	10.86
Private problems in life	20	9.05
Unsuitability of the working environment	15	6.79
Inability to work individually/lack of teamwork	13	5.88
Not believing in the benefits	3	1.36
Reasons for wanting to pursue postgraduate education* (N:427)		
Academic career	140	32.79
Specialization in a field	108	25.29
Professional advancement	104	24.36
Social status	40	9.37
Advantage in job applications	35	8.19

\* n multiplied.

14.70 % as “Late Majority,” and 1.10 % as “Laggards.” According to the participants’ ASRS results, the mean score for Negative Attitude towards Scientific Research was  $18.97 \pm 6.18$ , the mean score for Reluctance to Assist Researchers was  $17.29 \pm 5.37$ , the mean score for Positive Attitude towards Scientific Research was  $21.34 \pm 4.55$ , and the mean score for Positive Attitude towards Researchers was  $28.90 \pm 5.20$ .

The comparison results of participants’ ASRS and IIS scores with variables are presented in Table 2. There were no statistically significant differences found between participants’ IIS mean scores and variables such as gender, class, high school graduated from, foreign language proficiency level, previous biostatistics and research course taking status, previous involvement in any scientific research process, status of following English professional periodicals, frequency of reading scientific publications in the field of nursing, status of benefiting from the information read in scientific publications while providing nursing care in clinical practice, and status of planning to get postgraduate education ( $p > 0.05$ ). Statistically significant differences were found between participants’ mean IIS scores and variables such as computer literacy, self-perceived competence in conducting research, willingness to participate in scientific research, and following Turkish publications ( $p < 0.05$ ). According to these results, it was observed that participants with higher computer proficiency, those who felt competent in conducting research, those willing to engage in scientific research, and those who track Turkish-language publications had higher average IIS scores compared to others (Table 2).

Statistically significant differences were found between participants’ ASRS subscales and certain variables (Table 2). Statistically significant higher scores in Negative Attitude towards Scientific Research were observed among male participants, those who attended other high schools, those who felt inadequate in conducting research, those who did not want to participate in a scientific research, those who did not use the findings of the publications they read in the clinic, and those who did not consider postgraduate education ( $p < 0.05$ ). Statistically significant higher scores in Reluctance to Assist Researchers were observed among male participants, those who indicated proficiency in a foreign language, those who felt inadequate in conducting research, those who did not want to participate in a scientific research, and those who did not consider postgraduate education ( $p < 0.05$ ). Statistically significant higher scores in Positive Attitude towards Scientific Research were observed among participants first year students than 3rd and 4th year students, who did not take biostatistics and research courses, those who felt competent in conducting research, those who wanted to participate in a scientific research, those who followed Turkish and English periodicals, those who followed publications more frequently, and those who considered postgraduate education ( $p < 0.05$ ). Statistically significant higher scores in Positive Attitude towards Researchers were

Table 2

The comparison results of participants’ ASRS subscales and IIS scores with variables.

	ASRS Negative attitude towards scientific research	ASRS Reluctance to help researchers	ASRS Positive attitude towards scientific research	ASRS Positive attitude towards researchers	IIS
	Mean ± Standard Deviation	Mean ± Standard Deviation	Mean ± Standard Deviation	Mean ± Standard Deviation	Mean ± Standard Deviation
Total score	18.97 ± 6.18	17.29 ± 5.37	21.34 ± 4.55	28.90 ± 5.20	64.00 ± 8.20
Gender					
Female	18.50 ± 6.07	16.42 ± 4.74	21.47 ± 4.52	29.77 ± 4.76	64.44 ± 8.53
Male	19.96 ± 6.31	19.14 ± 6.13	21.07 ± 4.63	27.09 ± 5.61	63.07 ± 7.40
p	<b>0.032<sup>a</sup></b>	<b>&lt;0.001<sup>b</sup></b>	0.586 <sup>b</sup>	<b>&lt;0.001<sup>b</sup></b>	0.070 <sup>b</sup>
Class					
1st	18.77 ± 6.17	17.10 ± 5.71	22.95 ± 4.50	29.76 ± 5.10	64.28 ± 10.00
2nd	19.29 ± 6.51	17.34 ± 4.81	21.38 ± 4.32	29.14 ± 4.74	64.32 ± 7.50
3rd	19.61 ± 6.06	17.87 ± 5.62	20.28 ± 3.99	28.44 ± 5.01	63.96 ± 6.65
4th	18.14 ± 5.91	16.84 ± 5.40	20.78 ± 5.02	28.26 ± 5.88	63.38 ± 8.52
p	0.662 <sup>d</sup>	0.545 <sup>d</sup>	<b>0.001<sup>d</sup></b>	0.164 <sup>d</sup>	0.857 <sup>c</sup>
Graduated high school					
Health vocational school	16.76 ± 6.87	16.36 ± 5.60	22.10 ± 4.06	29.26 ± 4.31	63.16 ± 7.53
Others	19.16 ± 6.09	17.37 ± 5.36	21.27 ± 4.59	28.87 ± 5.27	64.07 ± 8.26
p	<b>0.039<sup>b</sup></b>	0.217 <sup>b</sup>	0.590 <sup>b</sup>	0.918 <sup>b</sup>	0.622 <sup>b</sup>
Foreign language proficiency level					
Adequate	20.28 ± 6.83	19.08 ± 6.84	22.18 ± 4.79	28.04 ± 5.73	64.46 ± 7.96
Undecided	18.93 ± 5.72	17.23 ± 4.97	21.29 ± 4.83	29.37 ± 4.96	63.88 ± 7.95
Inadequate	18.55 ± 6.44	16.72 ± 4.86	21.08 ± 4.33	28.99 ± 5.10	63.90 ± 8.42
p	0.125 <sup>c</sup>	<b>0.042<sup>d</sup></b>	0.346 <sup>d</sup>	0.378 <sup>d</sup>	0.758 <sup>d</sup>
Computer proficiency level					
Adequate	18.17 ± 6.60	17.05 ± 5.98	21.53 ± 4.85	28.73 ± 5.35	65.58 ± 7.62
Undecided	19.40 ± 5.76	17.10 ± 4.71	21.06 ± 4.23	29.14 ± 5.11	63.63 ± 7.70
Inadequate	19.26 ± 6.20	17.76 ± 5.49	21.47 ± 0.64	28.80 ± 5.19	62.87 ± 9.11
p	0.216 <sup>d</sup>	0.365 <sup>d</sup>	0.537 <sup>d</sup>	0.879 <sup>d</sup>	<b>0.047<sup>d</sup></b>
Previous biostatistics and research course taking status					
Yes	19.14 ± 6.10	17.27 ± 5.60	20.51 ± 4.39	28.37 ± 5.42	63.52 ± 7.78
No	18.84 ± 6.25	17.31 ± 5.20	22.00 ± 4.59	29.34 ± 4.98	64.38 ± 8.52
p	0.638 <sup>a</sup>	0.707 <sup>b</sup>	<b>0.002<sup>b</sup></b>	0.087 <sup>b</sup>	0.301 <sup>b</sup>
Evaluation of your competence in conducting scientific research					
Competent enough	17.43 ± 7.50	15.79 ± 6.70	23.36 ± 5.05	30.34 ± 5.03	67.53 ± 8.80
Undecided	19.03 ± 5.71	17.53 ± 5.00	21.71 ± 3.98	29.09 ± 4.98	63.74 ± 8.07
Inadequate	20.03 ± 5.98	17.88 ± 4.94	18.87 ± 4.46	27.34 ± 5.49	61.89 ± 7.19
p	<b>0.031<sup>c</sup></b>	<b>0.001<sup>d</sup></b>	<b>&lt;0.001<sup>d</sup></b>	<b>&lt;0.001<sup>d</sup></b>	<b>&lt;0.001<sup>d</sup></b>
Previous involvement in any scientific research process					
Yes	18.32 ± 6.72	16.47 ± 5.45	22.11 ± 4.88	28.80 ± 5.90	65.14 ± 8.43
No	19.17 ± 6.00	17.55 ± 5.34	21.10 ± 4.43	28.94 ± 4.97	63.65 ± 8.11
p	0.263 <sup>a</sup>	0.097 <sup>b</sup>	0.096 <sup>b</sup>	0.689 <sup>b</sup>	0.262 <sup>b</sup>
Being interested in taking part in the scientific research process					

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Table 2 (continued)

	ASRS Negative attitude towards scientific research	ASRS Reluctance to help researchers	ASRS Positive attitude towards scientific research	ASRS Positive attitude towards researchers	IIS
Yes	17.88 ± 6.52	16.66 ± 5.38	23.35 ± 3.88	29.99 ± 4.82	65.37 ± 8.53
No	20.39 ± 5.40	18.11 ± 5.27	18.72 ± 4.01	27.50 ± 5.35	62.21 ± 7.40
p	<0.001 <sup>b</sup>	0.006 <sup>b</sup>	<0.001 <sup>b</sup>	<0.001 <sup>b</sup>	<0.001 <sup>a</sup>
Status of following Turkish professional periodicals (books, articles, etc.)					
Yes	18.00 ± 6.09	16.80 ± 5.53	22.61 ± 4.33	29.63 ± 5.34	66.21 ± 8.03
No	19.42 ± 6.18	17.52 ± 5.30	20.75 ± 4.55	28.57 ± 5.11	62.98 ± 8.09
p	0.054 <sup>b</sup>	0.157 <sup>b</sup>	<0.001 <sup>b</sup>	0.014 <sup>b</sup>	0.001 <sup>b</sup>
Status of following English professional periodicals (books, articles, etc.)					
Yes	19.28 ± 7.36	18.74 ± 8.28	23.17 ± 4.78	27.56 ± 6.39	66.25 ± 9.00
No	18.94 ± 6.04	17.13 ± 4.92	21.13 ± 4.49	29.06 ± 5.03	63.74 ± 8.08
p	0.896 <sup>b</sup>	0.584 <sup>b</sup>	0.015 <sup>b</sup>	0.322 <sup>b</sup>	0.070 <sup>a</sup>
Frequency of reading scientific publications in the field of nursing					
Never	19.84 ± 6.23	17.61 ± 5.41	20.05 ± 4.90	28.59 ± 5.10	62.62 ± 9.65
Sometimes	18.74 ± 6.12	17.20 ± 5.30	21.68 ± 4.34	28.96 ± 5.21	64.32 ± 7.40
Frequently	18.23 ± 6.23	17.52 ± 6.30	23.35 ± 3.83	29.64 ± 6.04	66.82 ± 9.59
Always	10.00 ± 0.00	11.50 ± 3.53	26.50 ± 3.53	31.00 ± 2.83	69.50 ± 3.53
p	0.078 <sup>c</sup>	0.402 <sup>d</sup>	0.003 <sup>d</sup>	0.524 <sup>d</sup>	0.253 <sup>d</sup>
Status of benefiting from the information read in scientific publications while providing nursing care in clinical practice					
Yes	18.37 ± 5.96	16.90 ± 5.16	21.59 ± 4.29	29.05 ± 5.30	64.58 ± 7.72
No	19.97 ± 6.42	17.95 ± 5.68	20.92 ± 4.95	28.65 ± 5.04	63.04 ± 8.89
p	0.010 <sup>b</sup>	0.083 <sup>b</sup>	0.244 <sup>b</sup>	0.264 <sup>b</sup>	0.079 <sup>a</sup>
Status of planning to get postgraduate education					
Yes	18.27 ± 6.26	16.86 ± 5.48	22.39 ± 4.44	29.33 ± 5.21	64.50 ± 8.48
No	20.08 ± 5.89	17.98 ± 5.14	19.68 ± 4.24	28.22 ± 5.12	63.20 ± 7.69
p	0.006 <sup>b</sup>	0.026 <sup>b</sup>	<0.001 <sup>b</sup>	0.014 <sup>b</sup>	0.135 <sup>b</sup>

ASRS: Attitude towards Scientific Research Scale; IIS: Individual Innovativeness Scale;

In bold statistical significance <0.05;

<sup>a</sup> : Student t-test;

<sup>b</sup> : Mann whitney U test;

<sup>c</sup> : One way ANOVA test;

<sup>d</sup> : Kruskal Wallis test.

observed among females, those who felt competent in conducting research, those who wanted to participate in a scientific research, those who followed Turkish periodicals, and those who considered post-graduate education ( $p < 0.05$ ).

The results of the correlations of the participants' scores from the scales with each other are shown in Table 3. It is seen that there is a statistically significant relationship between the students' individual level of innovativeness and attitude to scientific research. It was found that there is a negative relationship between reluctance to help researchers and negative attitude to research and other scales (Table 3).

As a result of the analyses, the variables demonstrating statistically significant impacts on individual innovativeness profiles—namely, perceived computer skills, perceived competence in conducting scientific research, willingness to participate in the scientific research process, and adherence to Turkish professional periodicals—were incorporated into the regression model, as presented in Table 4. In the

Table 3

The results of participants' ASRS subscales and IIS scores correlation tests.

	ASRS Negative attitude towards scientific research	ASRS Reluctance to help researchers	ASRS Positive attitude towards scientific research	ASRS Positive attitude towards researchers	IIS
ASRS Negative Attitude towards Scientific Research	1				
ASRS Reluctance to Help Researchers	r 0.543 p 0.000	1			
ASRS Positive Attitude Towards Scientific Research	r -0.313 p 0.000	-0.310 0.000	1		
ASRS Positive Attitude Towards Researchers	r 0.251 p 0.000	-0.375 0.000	0.468 0.000	1	
IIS	r -0.222 p 0.000	-0.364 0.000	0.332 0.000	0.294 0.000	1

ASRS: Attitude towards Scientific Research Scale; IIS: Individual Innovativeness Scale; r = Pearson correlation test result; p = p value.

multiple regression analysis, the interrelation among variables delineated a model specifying the impact of nursing students' attitudes towards scientific research and associated factors on their individual innovativeness profiles. As per the model, discerned outcomes revealed that a statistically significant effect on individual innovativeness profiles was attributed to an augmented positive attitude towards scientific research among nursing students, a diminished reluctance to assist researchers, a perceived proficiency in computer skills, and the practice of regularly following Turkish professional periodicals. Within the model, nursing students' attitudes towards scientific research and associated factors elucidate 22.9 % of the variance in individual innovativeness profiles. Specifically, an increase in nursing students' positive attitudes towards scientific research, perceived proficiency in computer skills, and regular following of Turkish professional periodicals demonstrated positive influences on their individual innovativeness profiles, with coefficients of 0.155 ( $\beta = 0.155$ ), 0.099 ( $\beta = 0.099$ ), and 0.108 ( $\beta = 0.108$ ) respectively. Conversely, a reduction in their reluctance to assist researchers exhibited a negative impact on individual innovativeness profiles, indicated by a coefficient of  $-0.273$  ( $\beta = -0.4273$ ) ( $p < 0.05$ , Table 4).

#### 4. Discussion

In our study, the mean score for IIS was determined to be  $64.00 \pm 8.20$ . There are numerous studies in the literature examining the mean scores of IIS among nursing students. When examining recent studies,  $64.87 \pm 7.08$ ;  $63.69 \pm 9.28$ ;  $65.40 \pm 7.17$ ;  $62.84 \pm 0.39$  and  $62.25 \pm 7.85$ , respectively (Baltacı and Metin, 2021; Baltacı and Ünalı Baydın, 2023; Ergin and Çınar Yücel, 2022; Kılınc and Kaya, 2022; Türkoğlu et al., 2022). Our study results demonstrate similar findings to the literature. In a study, the average IIS score was reported to be  $56.65 \pm 3.23$  before innovation education was provided to nursing students, and post-education it was recorded as  $62.58 \pm 9.73$ . It was found that the average increased after the education, but innovation scores still remained at a low level (Ceylantekin and Öcalan, 2022). The findings of our study are supportive of the literature. It is important to assess and

Table 4

Nursing students' attitudes towards scientific research and related factors predicting individual innovativeness profiles.

MODEL 1	Individual innovativeness scale						
	B	SE	$\beta$	t	p	95 % CI	
						Lower	Upper
Constant							
ASRS- Negative Attitude Towards Scientific Research	0.409	0.074	0,037	0.662	0.508	-0.097	0.195
ASRS- Reluctance to Help Researchers	-0.417	0.088	-0.273	4.752	0.000	-0.589	-0.244
ASRS- Positive Attitude Towards Scientific Research	0.278	0.108	0.155	2.568	0.011	0.065	0.492
ASRS- Positive Attitude Towards Researchers	0.161	0.085	0.102	1.889	0.060	-0.007	0.329
Perceived computer usage skills <sup>a</sup>	1.758	0.841	0.099	2.090	0.037	0.104	3.412
Perceived competence in conducting scientific research <sup>b</sup>	1.788	1.030	0,085	1.736	0.083	-0.237	3.813
The state of wanting to take part in the scientific research process <sup>c</sup>	0.502	0.891	0.030	0.563	0.574	-1.250	2.254
Status of following Turkish professional periodicals <sup>d</sup>	1.907	0.835	0.108	2.283	0.023	0.264	3.549

R = 0.478; R<sup>2</sup> = 0.229; F = 13.563; Durbin Watson = 1.890; p = 0.000

ASRS: Attitude towards Scientific Research Scale; B: Unstandardized Beta; SE: Standard Error;  $\beta$ : Standardized Beta; CI: Confidence Interval; R: correlation; R<sup>2</sup>: correlation coefficient (explained variance ratio); F: model statistics; p: level of significance; a,b While coding, the those who feel adequate was coded as 1 and the those who feel inadequate and indecisive were coded as 0; c,d While coding, the yes was coded as 1 and the no was coded as 0.

enhance students' levels of innovation for them to adapt to evolving technologies (Eyi et al., 2022). This is crucial because students, through these innovative attributes, will pave the way for advancements in nursing care, management, education systems, and the conduct of scientific research in their future professions (Heydari et al., 2023).

In our study, according to the ISS results, innovativeness characteristics were identified as follows: 2.40 % were classified as "Innovators", 24.50 % as "Early Adopters", 57.30 % as "Early Majority", 14.70 % as "Late Majority", and 1.10 % as "Laggards". In the study by Özen et al. (2020), it is reported that among nursing students, 8.9 % were classified as innovators, 41.1 % as early adopters, 40.3 % as early majority, 8.5 % as late majority, and 1.2 % as laggards (Özen et al., 2020). In another study, it was found that among nursing students, 2.1 % were classified as innovators, 29.6 % as early adopters, 58 % as early majority, 10 % as late majority, and 0.3 % as laggards (Ergin and Çınar Yücel, 2022). According to the results of these studies, it is observed that students are predominantly early adopters, as seen in our findings. Being open to innovation contributes significantly to improving care and increasing patient satisfaction (Özdemir et al., 2022). Nurse educators should organize educational activities to promote nursing innovativeness among nursing students. In this context, nurse educators play a critical role in preparing students for real-world applications of the profession (Jenkins et al., 2021). It is believed that with the support of instructors during their education, students may have enhanced their interrogator abilities.

Technology has become an integral aspect of many individuals' lives. In our research, it was observed that students who indicated a high level of computer proficiency had higher scores in IIS. Conversely, a separate study reported no significant variance between computer usage levels and IIS (Özen et al., 2020). In another study, it was noted that there exists a significant positive relationship between students' IIS scores and their use of technological equipment (Turan et al., 2019). Similarly, in a study involving nursing students, a statistically significant relationship was found between students' attitudes towards computers and their computer self-efficacy (Hassona et al., 2020). Especially during the pandemic period, it is thought that the difference in our sample group, with some undergoing distance education and thus potentially enhancing their computer skills, may have been influenced. Additionally, in our study, participants who followed professional Turkish periodicals also exhibited higher average IIS scores. Alongside a study indicating that the status of following scientific research in nursing students did not influence their total IIS scores (Kılınç and Kaya, 2022), it is observed that nurses who follow publications related to their profession (Yanmış and Özcan, 2022) as well as nursing students (Baltacı and Metin, 2021) tend to have higher IIS scores. Following publications in their fields provides students with insights into their professional identity levels and preparedness for the nursing profession. In our study,

particularly, the high innovativeness levels of students who follow Turkish publications could be attributed to the ease of following Turkish publications.

In our study, Negative Attitude towards Scientific Research score reported to be  $18.97 \pm 6.18$ . In the studies conducted, the Negative Attitude towards Scientific Research score was determined as  $22.23 \pm 6.71$ ;  $18.71 \pm 4.98$ ;  $23.87 \pm 7.25$  and  $37.03 \pm 4.45$  (Aktaş and Sançar, 2021; Çağlar et al., 2020; Karahmetoglu, 2021; Yılmaz et al., 2020). According to the results of these studies, it is seen that our students' negative attitudes towards scientific research are quite low. In our study, Reluctance to Help Researchers score reported to be  $17.29 \pm 5.37$ . In the studies conducted, Reluctance to Help Researchers score was determined as  $20,37 \pm 6,90$ ;  $20.43 \pm 5.96$ ;  $22,89 \pm 7,26$  and  $29.33 \pm 5.85$  (Aktaş and Sançar, 2021; Çağlar et al., 2020; Karahmetoglu, 2021; Yılmaz et al., 2020). According to the results of these studies, the reluctance of our students to help researchers is also quite low. In our study, Positive Attitude towards Scientific Research score reported to be  $21.34 \pm 4.55$ . In the studies conducted, Positive Attitude Towards Scientific Research score was determined as  $25,09 \pm 5,79$ ;  $23.50 \pm 5.81$ ;  $20,86 \pm 6,91$  and  $25.82 \pm 4.17$  (Aktaş and Sançar, 2021; Çağlar et al., 2020; Karahmetoglu, 2021; Yılmaz et al., 2020). According to the results of these studies, it is seen that our students' positive attitudes towards scientific research are low compared to other studies. In our study, Positive Attitude towards Researchers score reported to be  $28.90 \pm 5.20$ . In the studies conducted, Positive Attitude Towards Researchers score was determined as  $23,92 \pm 4,97$ ;  $24.34 \pm 4.63$ ;  $22,80 \pm 4,74$  and  $22.84 \pm 5.41$  (Aktaş and Sançar, 2021; Çağlar et al., 2020; Karahmetoglu, 2021; Yılmaz et al., 2020). According to the results of these studies, it is seen that our students' positive attitudes towards researchers are high compared to other studies.

In the context of this study, nursing students' attitudes towards engaging in scientific research and associated factors, including perceived computer use skills, perceived competence in conducting scientific research, willingness to participate in the research process, and regular monitoring of Turkish professional periodicals, accounted for 22.9 % of the variance in individual innovativeness profiles (Table 4). Within the existing literature, there is a dearth of studies quantifying the proportion of variance in individual innovativeness profiles influenced by attitudes towards scientific research and related factors. Despite the absence of specific information regarding the percentage of change, the literature does encompass descriptive studies elucidating the factors that impact individual innovativeness profiles. In the literature, numerous factors impacting the individual innovativeness profiles of nursing students have been identified. These factors encompass socio-demographic variables, the perceived significance accorded to innovation, endorsement of innovative ideas, attendance at congresses/conferences pertinent to innovation, engagement in the development of innovative

products, self-efficacy levels, professional affinity, involvement in profession-related research activities, collaboration with educators possessing innovative profiles, emulation of role models, vigilant tracking of technological advancements, utilization of technological devices, and incorporation of innovation-focused courses throughout their educational trajectory (Atasoy et al., 2023; Shen et al., 2021; Turan et al., 2019; Xiang et al., 2023; Zayim and Ozel, 2015). Hence, the observation that attitudes towards scientific research and associated factors account for a 22.9 % variation in the individual innovativeness profiles of nursing students suggests a noteworthy outcome for the individual innovativeness profile, considering its susceptibility to the influence of numerous variables.

#### 4.1. Limitations

This study is subject to several limitations. The first limitation is that the information collected on attitudes towards scientific research and related factors and individual innovativeness profiles is based on students' self-evaluations. The second limitation of the study is the use of random sampling method. The third limitation is that attitudes towards scientific research may not develop immediately and may continue to develop even after graduation. This situation may have affected the average score of the attitude scale towards scientific research. The last limitation is that the innovation profile of nursing students may be affected by generational differences, since the Z and alpha generations are more prone to both technological developments and innovation.

#### 5. Conclusion

In this study, it was discerned that participants with elevated computer skills, a sense of competence in research conduct, a proclivity for engaging in scientific research, and a penchant for monitoring Turkish publications exhibited higher mean scores in the Individual Innovativeness Scale. Furthermore, the investigation revealed a notable curiosity among the nursing students who took part in the study. Additionally, the study established that nursing students' attitudes towards scientific research and associated factors possessed predictive capacity for individual innovativeness profiles.

Recommendations for future research include conducting this study with larger sample sizes and employing diverse sampling methods. Moreover, it is suggested to undertake multicenter investigations focusing on factors influencing innovation in nursing students and examining the impact of innovative practices on patient care. Specifically, studies assessing the post-graduation attitudes towards scientific research and innovativeness among nursing students could offer insights into comparing pre- and post-graduation variables, identifying factors contributing to these changes, and designing intervention studies to address these factors. Encouraging students to formulate scientific research projects and actively participate in related activities and competitions is advised as a means to enhance their attitudes towards scientific research and innovativeness. Additionally, it is recommended to plan studies that examine the effects of generational differences on attitudes towards innovation and scientific research.

#### 5.1. Contribution to practices

Innovation stands as an imperative prerequisite for the advancement and progression of nursing and healthcare. Scientific research serves as a pivotal source illuminating innovative developments. Therefore, it is imperative to accord significance to fostering innovative behaviors in nursing students, who represent the future mainstay of the nursing profession. Both nursing students and educators should vigilantly track innovations and incorporate diverse teaching technologies into education. Various pedagogical methods and techniques employed in nursing research courses can contribute to the cultivation of positive attitudes towards scientific research and the reinforcement of individual

innovativeness. Potential approaches include computer-assisted applications, project designs, brainstorming sessions, and the utilization of concept maps. Nurse educators, managers, and mentors should adopt innovative approaches that underpin evidence-based practice, seamlessly integrate these approaches into the curriculum and clinical settings, and actively guide students in research and innovation during clinical practice experiences. Attentiveness to the needs and ideas of nursing students, coupled with providing comprehensive guidance and constructive feedback, is paramount. Acknowledging and commending nursing students engaged in scientific research and demonstrating innovative attitudes is crucial for nurturing their performance. Furthermore, nurse educators should serve as exemplars in cultivating independent thinking and problem-solving skills among nursing students.

#### CRediT authorship contribution statement

**Aslı Akdeniz Kudubes:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Hülya Saray Kılıç:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation.

#### Ethical statement

To carry out the research, the ethical approval of the Scientific Research and Publication Ethics Committee of a university (date: 10.07.2023 and decision number: 11/2). The permission of research application was obtained from Bilecik Şeyh Edebali University, Faculty of Health Sciences, Department of Nursing.

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#### Declaration of competing interest

The authors report there are no competing interests to declare.

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