ORIGINAL ARTICLE

Mediation and Moderation Effects of 21st-century Skills, on the Relationship Between Self-compassion and Resilience in Nursing Students: A Cross-sectional Study

Hemşirelik Öğrencilerinde Öz-şefkat ve Psikolojik Dayanıklılık Arasındaki İlişkide 21. Yüzyıl Becerilerinin Aracılık ve Düzenleyicilik Etkisi: Kesitsel Bir Çalışma

 Sevda Yıldırım[1], Cansu Akdağ Topal[2]

[1]Department of Obstetrics and Gynecologic Nursing, Hacettepe University Faculty of Nursing, Ankara, Turkey
[2]Department of Nursing, Başkent University Faculty of Health Sciences, Ankara, Turkey

Abstract

Objective: This study investigates the mediating and moderating roles of 21st-century skills in the relationship between self-compassion and resilience among nursing students.

Method: This was a cross-sectional and descriptive study. The participants were nursing students from two universities. Study data was collected between November 2023 and December 2023. A participant information form, self-compassion scale short form, multidimensional 21st-century skills scale, and resilience scale for adults were used to collect data from nursing students (n=396). Mediating and moderating analyses were used to examine the potential mediating and moderating role of 21st-century skills in the relationship between self-compassion and resilience.

Results: Correlation analyses indicated that 21st-century skills, self-compassion, and resilience were significantly associated (p<0.05). Twenty-first-century skills, information and technology literacy skills, entrepreneurship and innovation skills, social responsibility and leadership skills significantly mediate the relationship between self-compassion and resilience (p<0.05). Moderation analysis indicated that critical thinking and problem-solving skills moderated the relationship between self-compassion and resilience (β=0.139, p<0.05).

Conclusion: Integrating self-compassion training and fostering 21st-century skills in nursing education is crucial for supporting future healthcare professionals' success and well-being. These interventions enhance resilience, enabling students to cope better with challenges.

Keywords: Nursing education, self-compassion, resilience, 21st-century skills, nursing students

Öz

Amaç: Araştırmanın amacı hemşirelik öğrencilerinde öz-şefkat ve psikolojik dayanıklılık arasındaki ilişkide 21. yüzyıl becerilerinin aracı ve düzenleyici etkisini incelemektir.

Yöntem: Kesitsel ve tanımlayıcı tipte bir araştırmadır. Araştırmanın örneklemini, iki farklı üniversiteden hemşirelik öğrencileri oluşturmuştur. Çalışma verileri Kasım 2023 ile Aralık 2023 tarihleri arasında toplanmıştır. Veriler, hemşirelik öğrencilerinden (n=396) katılımcı bilgi formu, öz-şefkat ölçeği kısa formu, çok boyutlu 21. yüzyıl becerileri ölçeği ve yetişkinler için psikolojik dayanıklılık ölçeği ile toplanmıştır. Öz-şefkat ve psikolojik dayanıklılık arasındaki ilişkide 21. yüzyıl becerilerinin potansiyel aracı ve düzenleyici rolünü incelemek için aracılık ve düzenleyicilik analizleri yapılmıştır.

Bulgular: Korelasyon analizleri, 21. yüzyıl becerileri, öz-şefkat ve psikolojik dayanıklılık arasında anlamlı bir ilişki olduğunu göstermiştir (p<0,05). Yirmi birinci yüzyıl becerileri, bilgi ve teknoloji okuryazarlığı becerileri, girişimcilik ve yenilikçilik becerileri, sosyal sorumluluk ve liderlik becerileri, öz-şefkat ile psikolojik dayanıklılık arasındaki ilişkide anlamlı bir aracılık rolü oynamıştır (p<0,05). Düzenleyicilik analizi, eleştirel düşünme ve problem çözme becerilerinin öz-şefkat ile psikolojik dayanıklılık arasındaki ilişkiyi düzenlediğini göstermiştir (β=0,139, p<0,05).

Sonuç: Öz-şefkat eğitimini entegre etmek ve hemşirelik eğitiminde 21. yüzyıl becerilerini geliştirmek, geleceğin sağlık profesyonellerinin başarılarını ve iyi oluşlarını desteklemek için kritik öneme sahiptir. Bu müdahaleler, öğrencilerin zorluklarla daha iyi başa çıkmasını sağlayarak psikolojik dayanıklılığı artırmaktadır.

Anahtar Kelimeler: Hemşirelik eğitimi, öz-şefkat, psikolojik dayanıklılık, 21. yüzyıl becerileri, hemşirelik öğrencileri

Introduction

Nursing students face numerous challenges during their educational journey, such as emotional strain, demanding exams, balancing personal and professional responsibilities, heavy workloads, and difficult clinical experiences (1). To navigate these challenges effectively, students benefit from developing resilience, which refers to the ability to adapt and recover from adversity. Resilience helps students cope with both academic and personal stressors, allowing them to succeed in their studies and future careers as nurses (2). In the context of professional nursing, resilience is also critical for long-term career sustainability, as nurses regularly encounter high-stress situations, patient suffering, and emotionally taxing work environments. Developing resilience early in their training equips nursing students to handle these realities throughout their careers.

One key factor that fosters resilience is self-compassion. Self-compassion entails acknowledging that one's own challenges are a natural part of life and treating oneself with care and understanding when things get tough (3). Students who practice self-compassion are more likely to be resilient, according to research, since they demonstrate higher levels of intrinsic desire, less fear of failing, and more confidence in their skills (4,5). Moreover, self-compassion contributes to emotional well-being and allows individuals to approach challenges with a constructive mindset, ultimately enhancing personal and professional growth (6). For professional nurses, self-compassion is equally important, as it helps mitigate burnout and compassion fatigue, which are prevalent in healthcare environments. Nurses who practice self-compassion are better equipped to provide empathetic care while maintaining their own emotional health.

In addition to self-compassion, nursing students must learn 21st-century skills in order to fulfill the demands of contemporary healthcare. These skills-like problem-solving, cooperation, communication, and decision-making-are essential for addressing the complexities of patient care in an increasingly fast-paced, technology-driven environment (7). By equipping themselves with these competencies, nursing students can better manage the diverse challenges of their profession and deliver high-quality, empathetic care

(8). For professional nurses, these skills are indispensable in managing patient care effectively, especially in interdisciplinary teams and rapidly changing clinical settings. The ability to adapt, make informed decisions, and communicate clearly with both patients and colleagues is fundamental to ensuring positive health outcomes.

Although the relationship between resilience and self-compassion has been previously studied (9,10), no study has yet been found that examines the role of 21st-century skills as both a mediator and moderator in this relationship. This study addresses this gap in the literature by exploring how 21st-century skills influence the connection between nursing students' resilience and self-compassion. By doing so, it offers valuable insights for nursing education and professional development, particularly in strengthening skills that promote both resilience and self-compassion. Unlike prior studies, which have primarily focused on resilience or self-compassion independently (11-14), our research highlights the multifaceted role of 21st-century skills such as critical thinking, technological literacy, and social responsibility-skills that are crucial in contemporary nursing practice. Furthermore, the application of mediation and moderation models provides a unique methodological approach, not widely explored in existing literature. A comparison with similar studies shows that, while other research has investigated self-compassion and resilience separately, none has examined the interactive effects of 21st-century skills, making our findings both novel and significant.

The Mediation and Moderation Hypothesis

The effect of self-compassion on resilience occurs indirectly simultaneously via six mediators and moderators [the multidimensional 21st-century skills scale (MCSS), information and technology literacy skills (ITLS), critical thinking and problem-solving skills (CTPSS), entrepreneurship and innovation skills (EIS), social responsibility and leadership skills (SRLS), and career awareness (CA) see Figure 1 for the multiple mediator and moderator model]:

1. Self-compassion is positively correlated with resilience among nursing students.

2. MCSS mediate the correlations between self-compassion and resilience.

3. a) ITLS, b) CTPSS, c) EIS, d) SRLS, and e) CA mediate the correlations between self-compassion and resilience.

4. MCSS moderate the correlations between self-compassion and resilience.

5. a) ITLS, b) CTPSS, c) EIS, d) SRLS, and e) CA moderate the correlations between self-compassion and resilience.

Main Points

- Self-compassion and resilience were found to positively correlate with 21st-century skills.
- Mediation analysis revealed that self-compassion had significant indirect effects on resilience through various 21st-century skills sub-dimensions, particularly in information and technology literacy, entrepreneurship and innovation, social responsibility and leadership.
- Critical thinking and problem-solving skills were found to significantly moderate the relationship between self-compassion and resilience.
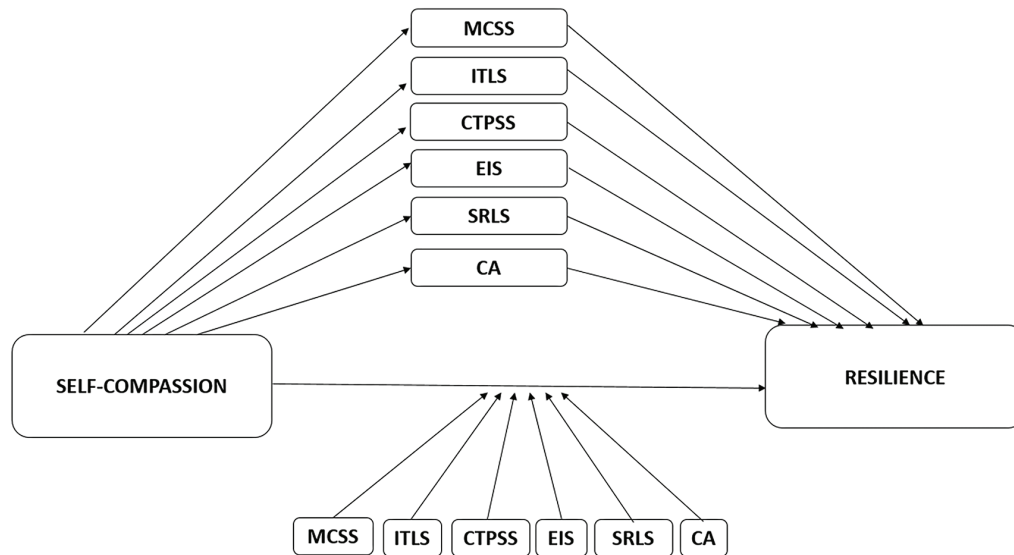
Figure 1.

Multiple Mediator and Moderator Models Depicting Students' Self-compassion and Resilience, Tested in the Current Study

MCSS=the multidimensional 21st-century skills scale, ITLS=information and technology literacy skills, CTPSS=critical thinking and problem-solving skills, EIS=entrepreneurship and innovation skills, SRLS=social responsibility and leadership skills, CA=career awareness

Material and Method

Design

This descriptive study was conducted from November 2023 to December 2023.

Settings and Participants

The study was carried out in two universities' nursing departments, and the sample was selected using convenience sampling from these departments. Participants were chosen based on the following inclusion criteria: (1) age ≥18 years; (2) current enrollment as an undergraduate nursing student at the participating universities; and (3) willingness to participate in the study. The exclusion criteria included incomplete questionnaire responses or a lack of willingness to participate. As recommended by Kline (15), the sample size for this study was determined using a methodological approach that relied on the ratio of the number of participants (n) to the model parameters (q). Ten relevant parameters (age, gender, class, family structure, mother's education level, father's education level, perceived economic situation, people live with, self-compassion level, and resilience level) were identified through structural equation modeling and multiple linear regression analysis to assess the influences on self-compassion. A minimum of five observations per parameter, ten cases per parameter, and an overall sample size that fell between 100 and 200 cases were considered in the sample size determination (15). Based on these calculations, the minimum required sample size was determined to be 100 students. However, a total of 396 nursing students participated in the study, exceeding the minimum requirement and ensuring sufficient statistical power.

Data Collection Instruments

MCSS, the self-compassion scale (SCS) short form, the brief resilience scale (BRS) for adults, and the participant information form were used to gather data.

Participant Information Form

After a review of pertinent research (16,17), the participant information form was created as a questionnaire to gather socio-demographic information from students. Age, gender, class year, perceived economic status, family structure, parental education levels, and living conditions are just a few of the variables that are covered in the questionnaire.

MCSS

To measure competence of 21st-century skills, MCSS was created. Cevik and Senturk (18) verified the validity and reliability of MCSS in Turkish. It consists of five sub-dimensions: CA, CTPSS, EIS, SRLS, and ITLS. Participants use a 5-point Likert scale to score their level of agreement with 41 items: strongly agree (5) to strongly disagree (1). There are seven reverse-scored items. By adding up all of the item scores and dividing by 41, the average score is calculated. Higher scores indicate greater proficiency in 21st-century skills. The Cronbach's alpha was 0.86 (18). In this study, the Cronbach's alpha value was found to be 0.91.

SCS Short Form

The SCS is employed to evaluate students' self-compassion levels. Widely utilised in surveys across numerous countries, the short form applies to diverse demographic groups and has been successfully employed with college students. Respondents rate their agreement with various statements using a five-point Likert scale ranging from 1 (almost never) to 5 (almost always). The final score on the SCS short form falls within the range of 12 to 70, with higher scores indicative of greater self-compassion levels (19). In this study, the Cronbach's alpha value was found to be 0.83.

BRS for Adults

A valid and reliable tool for evaluating human resilience is the BRS, which was first created by Smith et al. (20) and translated into Turkish by Doğan (21). Comprising six items, respondents use a scale of 1 (strongly disagree) to 5 (strongly agree) to indicate how much they agree with each of the statements. The range of total points is 6 to 30. The BRS is scored by reversing the coding of items 2, 4, and 6, and then figuring out the average of all item scores. A score of ≥3.99 indicates high resilience, whereas a score of ≤2.95 indicates poor resilience for individuals and the overall population. For females, a score of ≥2.87 indicates poor resilience, while a score of ≥3.91 indicates high resilience (20). In this study, the Cronbach's alpha value was found to be 0.88.

Data Collection

An online Google Forms survey was used to gather the data during November and December of 2023. Access to the survey link was facilitated through a QR code, allowing participants to use mobile phones or computers. The survey was distributed through WhatsApp groups catering to students. Participants were provided with information regarding the research's objectives and significance and were assured of the confidentiality of their data. Additionally, measures were implemented to ensure users could only complete the questionnaire once.

Statistical Analysis

In the study's statistical analysis, various methodologies were utilised, encompassing descriptive statistics, correlation analyses, reliability assessments employing Cronbach's alpha coefficient, regression modelling, and mediation and moderation analyses. Pearson correlation coefficient was employed to explore the relationships among scale scores, with the correlation results graphically presented using the ggcorrplot package in the R program (22). The subscale and total scores of the 21st-century skills scale functioned as mediator and moderator variables, respectively.

Self-compassion was designated as the independent variable, while the resilience scale was the dependent variable. Mediation analyses entailed generating a bootstrap sample (n=5000) to assess the significance of indirect effects, emphasising whether the confidence intervals of indirect effects encompassed zero. For mediation analyses, bootstrap-based linear regression was used with 5000 resampling iterations. For moderation effect analyses, Z-scores were computed for the variables, and the significance of interaction coefficients was evaluated. Moderation analyses were conducted using hierarchical regression analysis. The threshold for statistical significance was set at p<0.05 for all analyses. IBM SPSS 27 software was used for all analyses, with the PROCESS plug-in used as a supplement.

Ethical Considerations

This study was approved by the Başkent University's Ethics Board (approval no: E-62310886-605.99-239101, date: 07.11.2023). Ethical approval was obtained in accordance with the principles set forth in the Declaration of Helsinki. Before participation, all respondents were provided with comprehensive written information regarding the study's purpose, procedures, and potential risks. Each participant provided informed consent, affirming their voluntary participation and understanding of their rights throughout the study. The confidentiality and privacy of the participants were ensured by anonymising all data. Participants were also assured that their responses would be kept confidential and used solely for the purpose of the research. Measures were put in place to protect participants' personal information and to ensure their rights and welfare were upheld during the study.

Results

The students' ages ranged from 18 to 29 years old, with a mean age of 20.84 years (standard deviation 1.53). Most students in the present sample were females (88.1%). Approximately 40.9% of the students were in their first year, 85.6% reported belonging to nuclear families, and 56.8% indicated living with friends. Moreover, 41.1% of the students' mothers had an education level below secondary school, whereas only 24.0% of the students' fathers had similar educational attainment (Table 1).
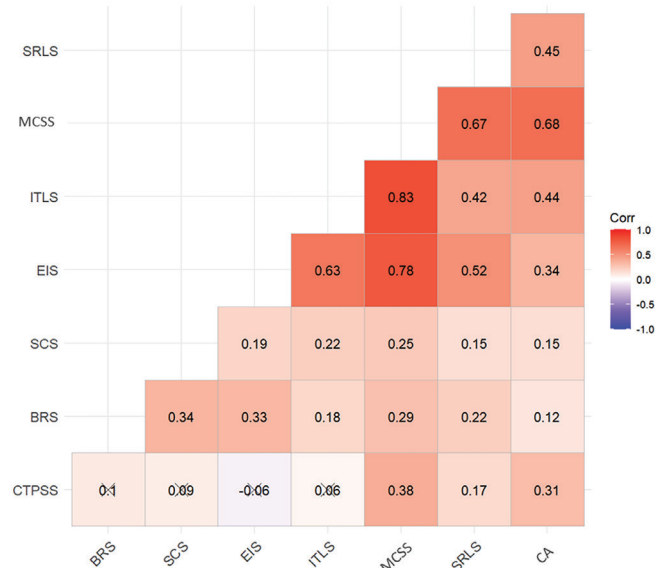
Figure 2 illustrates the bivariate correlation matrix among the study variables. In particular, self-compassion (r=0.25, p<0.005) and resilience (r=0.29, p<0.005) were found to positively correlate with 21st-century skills. Skills related to entrepreneurship and innovation (r=0.19, p<0.005), information and technology literacy (r=0.22, p<0.005), social responsibility and leadership (r=0.15, p<0.005), and career awareness (r=0.15, p<0.005) were found to be positively correlated with self-compassion. Additionally, entrepreneurship and innovation skills (r=0.33, p<0.005), information and technology literacy skills (r=0.18, p<0.005), social responsibility and leadership skills (r=0.22, p<0.005), and career awareness (r=0.12, p<0.005) were found to positively correlate with resilience.

Table 1. Participant Demographics (n=396)		
	n	**%**
Age 20.84±1.53 (min: 18.00; max: 29.00)		
Gender		
Female	349	88.1
Male	44	11.1
Prefer not to say	3	0.8
Class		
1.	162	40.9
2.	81	20.5
3.	76	19.2
4.	77	19.4
Family structures		
Nuclear family	339	85.6
Extended family	37	9.3
Single-parent family	20	5.1
Mother's education level		
Less than secondary school	163	41.1
Secondary school graduate	76	19.2
High school and more graduate	157	39.6
Father's education level		
Less than secondary school	95	24.0
Secondary school graduate	77	19.5
High school and more graduate	224	56.5
Perceived economic situation		
Income more than expense	60	15.2
Income equals expense	290	73.2
Income less than expense	46	11.6
Live with		
Family	133	33.6
Friends	225	56.8
Alone	38	9.6

Figure 2.
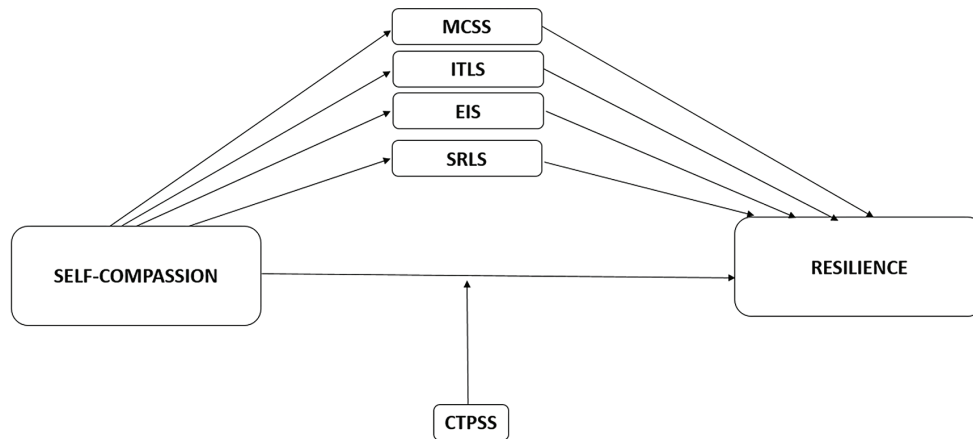**Correlation Between Scale and Sub-dimension Scores**
SRLS=social responsibility and leadership skills, MCSS=the multidimensional 21st-century skills scale, ITLS=information and technology literacy skills, EIS=entrepreneurship and innovation skills, SCS=self-compassion scale, BRS=brief resilience scale, CTPSS=critical thinking and problem-solving skills, CA=career awareness

Mediation Analyses

The results pertaining to the mediation function of the sub-dimensions and total levels of 21st century skills are shown in Table 2. The indirect effects of each mediator were examined in this analysis since all six mediators (21st skills and its sub-dimensions) were entered at the same time. The findings showed that self-compassion and 21st-century skills were positively correlated, and that resilience was favorably correlated with 21st-century skills. Similarly, self-compassion positively correlated with the three sub-dimensions of 21st-century skills (information and technology literacy, entrepreneurship and innovation, social responsibility and leadership), and these sub-dimensions were positively associated with resilience. Self-compassion was found to have significant indirect effects on resilience through 21st century skills, information and technology literacy, entrepreneurship and innovation, social responsibility and leadership (Figure 3). The models' critical thinking, problem-solving, and career awareness coefficients' confidence intervals, however, indicate that these variables do not substantially mediate (Table 2).

Moderation Analysis

Hypotheses 4 and 5 were assessed through regression analysis, specifically by regressing the self-compassion score on the resilience score and its interaction with the 21st century skills and its sub-dimension scores. SCS and the CTPSS had a significant interaction [B=0.139, 95% confidence interval (CI) (0.052, 0.227), p<0.05], as shown in Figure 3, indicating that the relationship between resilience and self-compassion was moderated by CTPSS. The association between self-compassion and resilience is only moderated by CTPSS, according to the overall findings (Table 3).

Figure 3.
Multiple Mediator and Moderator Models Depicting Students' Self-compassion and Resilience
MCSS=the multidimensional 21st-century skills scale, ITLS=information and technology literacy skills, EIS=entrepreneurship and innovation skills, SRLS=social responsibility and leadership skills, CTPSS=critical thinking and problem-solving skills

Table 2. Mediator Model Analyses Using 5,000 Bootstraps (n=396)					
Mediations	**Effect types**	**Statistics**			
SCS→ITLS→BRS	Direct effect	Coefficient	SE	LBCI	UBCI
		0.418	0.064	0.293	0.543
	Indirect effect	Coefficient	BootSE	Boot-LBCI	Boot-UBCI
		0.032	0.017	0.002	0.069
SCS→CTPSS→BRS	Direct effect	Coefficient	SE	LBCI	UBCI
		0.442	0.063	0.319	0.565
	Indirect effect	Coefficient	BootSE	Boot-LBCI	Boot-UBCI
		0.009	0.009	-0.006	0.028
SCS→EIS→BRS	Direct effect	Coefficient	SE	LBCI	UBCI
		0.380	0.061	0.260	0.500
	Indirect effect	Coefficient	BootSE	Boot-LBCI	Boot-UBCI
		0.071	0.023	0.030	0.118
SCS→SRLS→BRS	Direct effect	Coefficient	SE	LBCI	UBCI
		0.416	0.062	0.294	0.538
	Indirect effect	Coefficient	BootSE	Boot-LBCI	Boot-UBCI
		0.035	0.015	0.010	0.067
SCS→CA→BRS	Direct effect	Coefficient	SE	LBCI	UBCI
		0.437	0.063	0.313	0.560
	Indirect effect	Coefficient	BootSE	Boot-LBCI	Boot-UBCI
		0.014	0.011	-0.005	0.039
SCS→MCSS→BRS	Direct effect	Coefficient	SE	LBCI	UBCI
		0.379	0.063	0.256	0.502
	Indirect effect	Coefficient	BootSE	Boot-LBCI	Boot-UBCI
		0.072	0.023	0.031	0.121
SE=standart error, Boot=bootstrapped, LBCI=lower bound confidence interval, UBCI=upper bound confidence interval, MCSS=the multidimensional 21st-century skills scale, ITLS=information and technology literacy skills, CTPSS=critical thinking and problem-solving skills, EIS=entrepreneurship and innovation skills, SRLS=social responsibility and leadership skills, CA=career awareness, SCS=self-compassion scale, BRS=brief resilience scale					

Table 3. Moderation Model Analysis (n=396)						
Moderators	Regressors	Coefficient	SE	LBCI	UBCI	R²
ITLS	Constant	-0.005	0.048	-0.099	0.090	0.129
	Z-SCS	0.316	0.049	0.221	0.411	
	Z-ITLS	0.108	0.049	0.013	0.203	
	Interaction	0.022	0.043	-0.061	0.106	
CTPSS	Constant	-0.013	0.047	-0.105	0.079	0.143
	Z-SCS	0.348	0.047	0.255	0.440	
	Z-CTPSS	0.064	0.047	-0.029	0.156	
	Interaction	0.139	0.045	0.052	0.227	
EIS	Constant	0.008	0.046	-0.083	0.099	0.192
	Z-SCS	0.290	0.046	0.199	0.381	
	Z-EIS	0.277	0.046	0.186	0.368	
	Interaction	-0.040	0.045	-0.128	0.049	
SRLS	Constant	0.003	0.047	-0.090	0.095	0.146
	Z-SCS	0.317	0.047	0.224	0.410	
	Z-SRLS	0.174	0.047	0.081	0.267	
	Interaction	-0.018	0.048	-0.111	0.076	
CA	Constant	-0.009	0.048	-0.102	0.085	0.127
	Z-SCS	0.337	0.048	0.243	0.431	
	Z-CA	0.072	0.048	-0.022	0.165	
	Interaction	0.062	0.044	-0.025	0.148	
MCSS	Constant	-0.009	0.047	-0.103	0.084	0.164
	Z-SCS	0.288	0.048	0.194	0.382	
	Z-MCSS-21	0.215	0.048	0.121	0.309	
	Interaction	0.038	0.044	-0.048	0.124	

SE=standart error, LBCI=lower bound confidence interval, UBCI=upper bound confidence interval, R²=coefficient of determination, Z=Z score, ITLS=information and technology literacy skills, CTPSS=critical thinking and problem-solving skills, EIS=entrepreneurship and innovation skills, SRLS=social responsibility and leadership skills, CA=career awareness, SCS=self-compassion scale, MCSS=the multidimensional 21st-century skills scale

Discussion

This study examined the mediation and moderation effects of 21st-century skills on the relationship between nursing students' resilience and self-compassion. These findings have important implications for professional nursing as well, as both self-compassion and 21st-century skills are critical not only during education but also throughout nurses' careers. The ability to maintain resilience and adapt to the evolving demands of healthcare is essential for delivering high-quality care, managing stress, and preventing burnout in professional practice. We find out the important connection between nursing students' resilience and self-compassion. In their study, Zhao et al. (9) sought to investigate and analyze a model outlining possible pathways between self-compassion and depressive symptoms, and they found a substantial correlation between resilience and self-compassion. The study conducted by Lancaster et al. (10) sought to determine the degree of self-compassion and resilience among nursing students and discovered a strong

correlation between the two variables. Similar to our findings, the study by Siware and Paul (23) also found a strong positive correlation between self-compassion and resilience. There are a number of reasons why self-compassion and resilience are related, such as better coping mechanisms, fewer negative feelings, better problem-solving skills, more social support, and better stress management. This discovery aligns with multiple studies delving into similar relationships (24,25). The positive connection between nursing students' resilience and self-compassion highlights the importance of encouraging self-kindness and actions to support future nurses' happiness and career advancement.

Moreover, our results indirectly align with our hypotheses on the role that 21st-century skills, information and technology literacy, entrepreneurship and innovation, social responsibility, and leadership play in mediating the relationship between resilience and self-compassion. To the best of our knowledge, research has focused on the relationship between 21st-century skills and resilience

(26) and self-compassion (27), but has not yet examined the mediation effects of 21st-century skills between resilience and self-compassion. Furthermore, students who exhibit a strong degree of self-compassion can develop the psychological resources essential for successfully overcoming challenges. Self-compassion indirectly fosters proficiency in 21st-century skills, encouraging emotional intelligence, adaptability, collaboration, critical thinking, resilience, and a growth mindset (28). In the study by Potts and Le Hunte (29), it is suggested that students' ability to cope with uncertainty and develop resilience can be more easily cultivated as a result of self-compassion. Specifically, it is emphasized that self-compassion, supported by 21st-century skills, enhances students' motivation to help others, reinforcing resilience and facilitating their ability to manage stress (29). These findings highlight the mediating effect of 21st-century skills and their role in strengthening the relationship between self-compassion and resilience.

The association between resilience and self-compassion is influenced by the mediating role of ITLS. Potts and Le Hunte (29) highlight the role of 21st-century skills, such as information and technology literacy, in enhancing resilience through self-compassion. Our study similarly finds that self-compassion, when supported by these skills, facilitates the development of resilience by helping students better manage obstacles. The ability to effectively use technology and information resources allows individuals to overcome challenges more efficiently, as they can access tools that support emotional and cognitive well-being (30). This can be explained by the fact that people who have higher degrees of self-compassion are better able to overcome obstacles because they are more adept at using technology and knowledge.

In our study, it was concluded that the effect of self-compassion on resilience is strengthened through entrepreneurial and innovative skills. Self-compassion enhances individuals' ability to cope with challenges and develop creative thinking skills, while also promoting flexibility and risk tolerance in innovative and entrepreneurial thinking processes (31). Consistent with our findings, the literature emphasizes that developing entrepreneurship and resilience skills helps students cope with challenges (32,33). Similarly, our study found that entrepreneurial and innovative skills strengthen students' resilience. These skills enhance psychological flexibility, helping individuals cope with future uncertainties. In the healthcare field, the importance of these qualities is even greater, as the ability to produce innovative solutions directly impacts individuals' professional resilience. Liu et al. (34) emphasize the need to increase creativity and innovation in healthcare education, which has the potential to improve the quality of healthcare services.

The relationship between resilience and self-compassion is influenced by the mediating role of SRLS. In the context of self-compassion and resilience, the development of SRLS is crucial. Individuals with a high level of self-compassion tend to show empathy and understanding, leading to

positive relationships and effective leadership (35). On the contrary, individuals lacking self-compassion may struggle to empathize, which can hinder their ability to lead and take responsibility. The literature suggests that individuals with high self-compassion, along with leadership qualities, contribute to building trust and cooperation, which helps make communities more resilient (36). Leadership skills help individuals think solution-oriented during crises and guide others around them. These skills enable them to cope with stress and tackle challenges more effectively (37). Additionally, social responsibility enhances empathy and the sense of helping others, making it easier to deal with personal difficulties (36). Therefore, promoting self-compassion and developing SRLS can enhance resilience.

Our study results revealed that CTPSS are significant moderators that strengthen the relationship between self-compassion and resilience. Nursing students with higher levels of CTPSS exhibit greater resilience when demonstrating high levels of self-compassion. These findings suggest that while self-compassion plays a role in resilience, individuals with superior CTPSS may be even more resilient when adopting self-compassion practices. Supporting our findings, a study by Chen and Gan (38) also emphasized that CTPSS are fundamental components of adapting to new situations, and individuals who demonstrate resilience in challenging circumstances tend to possess higher levels of these skills. Similarly, a randomized controlled trial conducted by Şenocak and Demirkıran (39) reported that nursing students who received training to improve their problem-solving skills experienced an increase in resilience. This may be because CTPSS help individuals apply self-compassion strategies more effectively when coping with difficult situations, leading to a more efficient adaptation and coping process (40). Nursing students often experience high levels of stress due to academic requirements, clinical placements, and the need to balance personal and professional responsibilities (1). Therefore, CTPSS are crucial for nursing students to successfully manage academic demands and responsibilities (39). Teaching self-compassion techniques (5) alongside CTPSS (39) may help students manage stress and develop resilience. Individuals with strong CTPSS are more likely to navigate challenges effectively throughout their education and transition successfully into professional nursing roles.

Study Limitations

Our study faced several limitations. Firstly, as a cross-sectional design, it limits the ability to draw causal inferences, as the relationships between the variables were measured at a single point in time. Longitudinal studies could provide a clearer understanding of the causal pathways between 21st-century skills, self-compassion, and resilience over time. Secondly, while the sample was sufficiently large, it was drawn from nursing students in only one public and one foundation university, which may limit the generalizability of the findings to other student populations or academic disciplines. Thirdly, the study's descriptive nature may not fully capture the multidimensionality of the constructs of

21st-century skills, self-compassion, and resilience. Future qualitative or mixed-method research could offer a deeper exploration of these factors and their dynamic interplay. Despite these limitations, our study provides valuable insights into the relationships between 21st-century skills, self-compassion, and resilience among nursing students, and contributes to the literature on nursing education.

Conclusion

The results of this study highlight the strong correlation between nursing students' resilience and self-compassion. The positive correlation observed suggests that cultivating self-compassion could potentially enhance the resilience levels of individuals within this academic and professional context. This insight is particularly crucial in the demanding and often stressful environment that nursing students navigate. Moreover, the study highlights the role of MCSS as both mediators and moderators in the correlation between resilience and self-compassion. This implies that these skills influence the strength of the association between resilience and self-compassion and contribute to facilitating this relationship. In the context of professional nursing, these findings carry significant implications, as both self-compassion and resilience are critical for effective patient care, emotional regulation, and long-term career sustainability. This implies that interventions targeting the development of both self-compassion and these contemporary skills could offer a comprehensive approach to bolstering resilience among nursing students. Additionally, professional nursing practice requires the integration of 21st-century skills, such as teamwork, problem-solving, and adaptability, which are essential not only in clinical settings but also for managing the emotional and psychological challenges nurses face. Nursing practitioners can better manage the complicated nature of patient care, stress, and burnout by cultivating these competencies. The study highlights how crucial it is for nursing education programs to include self-compassion training and the development of multifaceted 21st-century skills. Equally important is the inclusion of these elements in continuous professional development for practicing nurses, as enhancing resilience and self-compassion throughout one's career can improve job satisfaction and patient outcomes. This strategy may enhance nursing students' resilience and general well-being, giving them the tools they need to successfully handle the difficulties of both their educational and professional lives. Additional studies and real-world initiatives in this field may yield insightful information for optimising nursing education, strengthening professional practice, and promoting the success of future healthcare professionals.

References

1. García-Izquierdo M, Ríos-Risquez MI, Carrillo-García C, Sabuco-Tebar EA. The moderating role of resilience in the relationship between academic burnout and the perception of psychological health in nursing students. Educational Psychology. 2018;38(8):1068-1079. [Crossref]

2. Şahin G, Buzlu S. The mediating role of perceived stress on relationship of resilience with self efficacy social support and the effective coping skills in nursing students. Journal of Anatolia Nursing and Health Sciences. 2017;20(2):122-136. [Crossref]

3. Dreisoerner A, Junker NM, van Dick R. The relationship among the components of self-compassion: a pilot study using a compassionate writing ıntervention to enhance self-kindness, common humanity, and mindfulness. J Happiness Stud. 2021;22:21-47. [Crossref]

4. Neff KD, Hsieh YP, Dejitterat K. Self-compassion, achievement goals, and coping with academic failure. Self Identity. 2005;4(3):263-287. [Crossref]

5. Smeets E, Neff K, Alberts H, Peters M. Meeting suffering with kindness: effects of a brief self-compassion intervention for female college students. J Clin Psychol. 2014;70(9):794-807. [Crossref]

6. Priatni MR, Listiyandini RA. The influence of self-compassion towards resilience among Indonesian medical students. International Conference The 1st South East Asia Regional Conference of Psychology (RCP) [Internet]. Hanoi, Vietnam. Available from: https://www.researchgate.net/publication/321243677_The_Influence_of_Self_Compassion_toward_Resilience_among_Medical_Students [Crossref]

7. Atasoy I, Özdemir SÇ, Evli M. Relationship between individual innovativeness and 21st century skills of nursing and midwifery students: a cross sectional study. Nurse Educ Today. 2023;126:105830. [Crossref]

8. Saleh HM, Ahmed MZ, Eldahshan MEA. Self-compassion in nursing practice. Menoufia Nurs J. 2022;7(1):55-62. Menoufia Nurs. J. 2022;7(1):55-62. [Crossref]

9. Zhao FF, Yang L, Ma JP, Qin ZJ. Path analysis of the association between self-compassion and depressive symptoms among

nursing and medical students: a cross-sectional survey. BMC Nurs. 2022;21(1):67. [Crossref]

10. Lancaster R, Englund H, Anibas M, Vande Berg C. Self-compassion and resilience in a national sample of nursing students amid the COVID-19 pandemic. Nurs Educ Perspect. 2023;44(1):43-45. [Crossref]

11. Sabir F, Ramzan N, Malik F. Resilience, self-compassion, mindfulness and emotional well-being of doctors. Indian J Posit Psychol. 2018;9(1). [Crossref]

12. Wu N, Hou Y, Jiang Y, Zeng Q, You J. Longitudinal relations between social relationships and adolescent life satisfaction: the mediating roles of self-compassion and psychological resilience. J Child Fam Stud. 2024;33(7):1-14. [Crossref]

13. Eryılmaz A, Yıldırım-Kurtuluş H, Yıldırım M. A cross-sectional and longitudinal study on the mediation effect of positive and negative affects in the relationship between self-compassion and resilience in early adolescents. Child Youth Serv Rev. 2024;161:107669. [Crossref]

14. Non-suicidal self-injury in Portuguese college students: relationship with emotion regulation, resilience and self-compassion. Curr Psychol. 2024;43(9):7877-7886. [Crossref]

15. Kline RB. Principles and Practice of Structural Equation Modeling. 4th ed., New York: Guilford Press, 2015. [Crossref]

16. Eraydın Ş, Karagözoğlu Ş. Investigation of self-compassion, self-confidence and submissive behaviors of nursing students studying in different curriculums. Nurse Educ Today. 2017;54:44-50. [Crossref]

17. Kaya E, Karatana Ö, Yıldırım TÖ. The relationship between the online learning process, 21st century skills and work readiness in senior nursing students. Nurse Educ Pract. 2023;73:103801. [Crossref]

18. Cevik M, Senturk C. Multidimensional 21th century skills scale: validity and reliability study. Cypriot J Educ Sci. 2019;14(1):11-28. [Crossref]

19. Yıldırım M, Sarı T. Adaptation of the short form of self-compassion scale into Turkish: a validity and reliability study. Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi. 2018;18(4):2502-2517. [Crossref]

20. Smith BW, Dalen J, Wiggins K, Tooley E, Christopher P, Bernard J. The brief resilience scale: assessing the ability to bounce back. Int J Behav Med. 2008;15(3):194-200. [Crossref]

21. Doğan T. Kısa psikolojik sağlamlık ölçeği'nin türkçe uyarlaması: geçerlik ve güvenirlik çalışması. The Journal of Happiness & Well Being. 2015;3(1):93-102. [Crossref]

22. Kassambara A. ggcorrplot: visuliation of a correlation matrix using 'ggplot' [Internet]. R package version 0.1.4. 2023. Available from: https://CRAN.R-project.org/package=ggcorrplot [Crossref]

23. Siware N, Paul B. IJCM_324A: self-compassion and its association with resilience among senior nursing students in rural area of Singur, West Bengal. Indian J Community Med. 2024;49(Suppl1):s93-s94. [Crossref]

24. Kotera Y, Maxwell-Jones R, Edwards AM, Knutton N. Burnout in professional psychotherapists: relationships with self-compassion, work-life balance, and telepressure. Int J Environ Res Public Health. 2021;18(10):5308. [Crossref]

25. Ma J, Xiao Q. Relationship between self-compassion and compassion for others: the mediated effect of perceived social support and psychological resilience. Psychol Rep. 2024:332941241226906. [Crossref]

26. Peck MR. The transformational ways of being: self-compassion, compassion & resilience in healthcare. Crisis, Stress, and Human Resilience: An International Journal. 2021;3(2):51-59. [Crossref]

27. Kamaruddin K, Jafri R, Ali NM. Barriers of higher education instution to developing 21st-century skills: a phenomenological inquiry. International Journal of Accounting, Finance and Business (IJAFB). 2023;8(47):234-247. [Crossref]

28. Raxsiri K, Songsriwittaya A. The study of differences between self-compassion and compassion to others using RUARCC learning framework in order to enhance compassion of late adolescence in Thailand. Journal of Positive Psychology and Wellbeing. 2022;6(3):1-10. [Crossref]

29. Potts M, Le Hunte B. Reframing resilience as a systemic issue: meta-competencies that transform individuals and learning ecologies. Systems Research and Behavioral Science. 2024;41(5):750-760. [Crossref]

30. Haleem A, Javaid M, Qadri MA, Suman R. Understanding the role of digital technologies in education: a review. Sustainable Operations and Computers. 2022;3:275-285. [Crossref]

31. Ginting-Szczesny BA, Kibler E, Cardon MS, Kautonen T, Hakala H. The role of passion diversity, compassion, and self-compassion for team entrepreneurial passion. Small Bus Econ. 2024;62:987-1007. [Crossref]

32. Cade L. A propensity to thrive: understanding individual difference, resilience and entrepreneurship in developing competence and professional identity. Br J Occup Ther. 2023;86(12):839-852. [Crossref]

33. Shahidi Delshad E, Nobahar M, Raiesdana N, Yarahmadi S, Saberian M. Academic resilience, moral perfectionism, and self-compassion among undergraduate nursing students: a cross-sectional, multi-center study. J Prof Nurs. 2023;46:39-44. [Crossref]

34. Liu HY, Wang IT, Chen NH, Chao CY. Effect of creativity training on teaching for creativity for nursing faculty in Taiwan: a quasi-experimental study. Nurse Educ Today. 2020;85:104231. [Crossref]

35. Wasylyshyn KM, Masterpasqua F. Developing self-compassion in leadership development coaching: a practice model and case study analysis. International Coaching Psychology Review. 2018;13(1):21-34. [Crossref]

36. Trilling B, Fadel C. 21st century skills: learning for life in our times. San Francisco: John Wiley & Sons; 2009. [Crossref]

37. Campbell D, Campbell K, Ness JW. Resilience through leadership. In: Biobehavioral resilience to stress. Routledge; 2008:79-110. [Crossref]

38. Chen Y, Gan N. Sustainable development of employability of university students based on participation in the internship promotion programme of Zhejiang province. Sustainability. 2021;13(23):13454. [Crossref]

39. Şenocak SÜ, Demirkıran F. Effects of problem-solving skills development training on resilience, perceived stress, and self-efficacy in nursing students: a randomised controlled trial. Nurse Educ Pract. 2023;72:103795. [Crossref]

40. Wilkes L, Cowin L, Johnson M, Zheng X. A montage of the qualities of the registered nurse. Int Nurs Rev. 2014;61(4):555-562. [Crossref]