MHA MEDIHEALTH ACADEMY
Journal of Nursing Care Research
Original Article
doi: 10.51271/JNCR-0057

A cross-sectional study on resilience and loneliness among nursing students in the virtual era

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Cite this article as: Kav S, Öztürk İ, Şengül M, Demir Ö, Çevik B, & Akgün Çıtak E. (2026). A cross-sectional study on resilience and loneliness among nursing students in the virtual era. *J Nurs Care Res, 3*(4), 111-117. doi:10.51271/JNCR-0057

Received: 14.04.2026 ◆ **Accepted**: 01.06.2026 ◆ **Published**: 27.10.2026

ABSTRACT

Aims: As the COVID-19 pandemic necessitated a rapid transition to digital education, nursing students faced a unique intersection of academic pressure and social isolation. The aim was to evaluate the levels of resilience and virtual environment loneliness among nursing students and to identify the predictors of resilience during the pandemic.

Methods: A cross-sectional, descriptive study was conducted with 188 nursing students (94% response rate) at a university in Ankara during the 2020-2021 academic year. Data were collected via an Information Form, the Connor-Davidson Resilience Scale (CD-RISC), and the Virtual Environment Loneliness Scale (VELS).

Results: Students reported moderate levels of virtual loneliness (58.44±11.87) and resilience (65.29±15.38). Correlation analyses revealed a weak positive relationship between total resilience and virtual socialization ($p<0.05$), while the relationship with virtual loneliness was negative but not significant ($p>0.05$). Significant predictors of resilience included the year of study and virtual socialization ($p<0.05$). The regression model explained 19.1% of the total variance in resilience scores.

Conclusion: Nursing students exhibited moderate levels of both resilience and virtual environment loneliness during the pandemic. Resilience among nursing students is influenced by year of study and health-promoting behaviors such as physical exercise. Fostering resilience may enhance students' ability to engage healthily in digital spaces, potentially mitigating the risks of digital isolation.

Keywords: COVID-19, students; nursing, resilience; psychological, education; nursing

INTRODUCTION

The COVID-19 pandemic triggered unprecedented global challenges that necessitated stringent public health interventions. Measures such as mandatory lockdowns, physical distancing, and the closure of educational institutions were vital to curbing viral transmission. However, these disruptions significantly altered the emotional and psychological routines of the population. Young adults, in particular, experienced a marked reduction in social interaction with peers and family (Labrague et al., 2021). For university students, the sudden transition to online distance education exacerbated feelings of social isolation and loneliness, which have been identified as primary catalysts for psychological distress during this period (Pineda et al., 2022; Shankar, 2023).

In the absence of physical interaction, individuals increasingly turned to digital platforms to seek information, maintain social connections, and alleviate the monotony of quarantine. Social media became a primary tool for accessing real-time updates on the pandemic and fulfilling the human need for socialization (Szeto et al., 2024). While these virtual environments provided a necessary bridge for communication, shopping, and entertainment, they also facilitated a shift in how interpersonal needs were met. Many individuals began preferring virtual communication over face-to-face contact to address daily needs, share emotional experiences such as sadness and anxiety, and alleviate feelings of loneliness (Holmes et al., 2020; Li et al., 2022).

The increase in internet usage has popularized the concept of "virtual loneliness," a state that may lead to significant psychological and physical distress (Korkmaz et al., 2014). For young people with limited offline social networks, the expansion of their "virtual world" can lead to a phenomenon known as virtual loneliness. Unlike traditional loneliness, which is often visible through social withdrawal, virtual loneliness can be insidious. It occurs when an individual becomes alienated from physical society while being immersed in a boundaryless digital environment. While these connections offer a temporary escape from negative emotions

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like anger or fear, they may ultimately isolate the individual from authentic social integration. Over time, this detachment can lead to a state where the individual exists within "the senses and emotions of networks," potentially ignoring real-world responsibilities and relationships (Candiotto, 2022; Li et al., 2022; Özsat et al., 2022; Shankar, 2023).

In the face of these adverse conditions, psychological resilience—defined as the capacity to recover from negative affect and adapt to stressors—emerged as a critical factor. During the pandemic, resilience, alongside positive coping mechanisms and social support, was a primary determinant in managing anxiety and depression, particularly among healthcare cohorts (Labrague, 2021). In the context of nursing education, resilience is viewed as an individualized developmental process in which personal protective factors are utilized to navigate stressors and adversities successfully. For nursing students, fostering resilience is essential not only for academic success but also for long-term professional well-being and adaptive coping in high-stakes clinical environments (Walsh et al., 2020; Aryuwat et al., 2023; Park & Choi, 2025).

During the COVID-19 pandemic, nursing education was significantly disrupted due to the transition to online learning, limitations in clinical training opportunities, and reduced face-to-face interactions. While information technology offers clear benefits, an over-reliance on digital spaces among youth struggling with social integration can exacerbate psychological withdrawal. Nursing students represent a unique demographic in this regard, as they faced the dual burden of general pandemic stressors and the specific pressures of their clinical vocation (Labrague, 2021). These challenges may have increased students' reliance on and engagement with social media and virtual platforms. Understanding the interplay between digital habits and psychological fortitude is vital for developing supportive educational curricula. Therefore, this study aims to evaluate the levels of resilience and virtual environment loneliness among nursing students during the COVID-19 pandemic.

The research questions were:

- What are the current levels of psychological resilience and virtual environment loneliness among nursing students?
- What is the relationship between nursing students' resilience and their experience of virtual environment loneliness?
- How do socio-demographic characteristics and patterns of social media usage influence scores on the Connor-Davidson Resilience Scale (CD-RISC) and the Virtual Environment Loneliness Scale (VELS)?

METHODS

Ethics

This study was conducted with the approval of the Başkent University Ethics Committee of the Academic Evaluation Coordination Office (Date: 08.04.2021, Decision No: 2021/25610). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. Written informed consent was obtained from all individual participants prior to their inclusion in the study. Permission to use the Turkish version of the CD-RISC and VELS was granted from the authors.

Study Design and Setting

This descriptive and cross-sectional study was conducted in the nursing department of the faculty of health sciences of a foundation university in Turkiye between 2020 and 2021. This study was reported using the 2007 version of the STROBE checklist.

Study Sample

The universe of the study consisted of 200 student nurses studying in the 1st, 2nd, 3rd and 4th grades of the nursing department of the faculty of health sciences of a foundation university. No sample selection was made in the study, and the study was conducted with 188 (94%) students who agreed to participate in the study.

Research Instruments and Data Collection

Data collection forms were given to 188 students who were continuing their education at the university between April 12, 2021 and April 30, 2021 by the researchers, and after filling them out, they were asked to leave them in the box placed by the researcher.

During the data collection period, infection control measures related to the COVID-19 pandemic were implemented in accordance with institutional and national guidelines. First-year students did not participate in clinical practice, while second-, third-, and fourth-year students continued their clinical rotations.

The data of the study were collected using an Information form, the Connor-Davidson Resilience Scale, and the VELS.

The information form consists of 26 questions that include demographic information about the students and information about determining the students' resilience and loneliness during the COVID-19 process (Aryuwat et al., 2023; Holmes et al., 2020; Li et al., 2022; Park & Choi, 2025)

The Connor-Davidson Resilience Scale (CD-RISC); The scale was developed by Connor and Davidson in 2003 and consists of 25 items (Connor & Davidson, 2003). Each item is rated on a 5-point scale (from 0= "not true at all" to 4= "true nearly all the time"). Scoring of the scale is based on summing the total of all items, each of which is scored from 0-4. The sum scores range from 0 to 100, with higher scores reflecting a higher level of resilience. The CD-RISC was reported to have good internal consistency (α=0.89) and test-retest reliability intraclass correlation coefficient: (0.871). The internal consistency of the scale for this sample was found 0.926 pointing to high internal consistency (Connor & Davidson, 2003). In the Turkish version, the three factors namely tenacity and personal competence, tolerance of negative affect and tendency toward spirituality of the scale obtained 0.93 (15 items), 0.79 (6 items), and 0.50 (3 items), respectively (Karairmak, 2010). In this study, Cronbach's alpha was found to be 0.920 for the subscale of tenacity and personal competence, 0.774 for the subscale of tolerance of negative affect, and 0.566 for the subscale of tendency toward spirituality.

VELS was developed by Korkmaz et al. (2014) to assess the loneliness levels of individuals in virtual environments. The

VELS is a Likert-type scale consisting of 20 items and three sub-dimensions. Each item is answered on a 1-5 scale (1= does not reflect at all, 5= completely reflects). Items 6, 7, 16, 17, 18, 19 and 20 were reverse coded. Either a total score can be calculated to measure virtual loneliness, or 3 different scores can be calculated to measure virtual socialization, virtual sharing and virtual loneliness. Total scores on the scale range from 20 to 100, with higher total scores indicating greater levels of loneliness in virtual environments. In the original study (Korkmaz et al, 2014), internal consistency scores were reported as 0.816 for the total VELS, 0.842 for Virtual Socialization, 0.809 for Virtual Sharing, and 0.614 for Virtual Loneliness. In the present study, Cronbach's alpha was 0.819 for the total VELS, and for the sub-scales virtual socialization: 0.833; virtual sharing 0.907; virtual loneliness 0.710.

Statistical Analysis

The data were analyzed using SPSS for Windows 25.0: SPSS Inc. Descriptive statistics (numbers, percentages, mean, and standard deviation) were used to analyze students' sociodemographic data. Tests of normal distribution, parametric tests, and correlation analyses were performed. The independent test and analysis of variance (ANOVA) were used to examine the presence of statistically significant differences in CD-RISC and VELS scores between the categorical variables. The p-value of <0.05 was considered statistically significant with a 95% confidence interval.

Normality testing revealed that skewness values ranged from -0.27 to 1.16 and kurtosis values ranged from -0.73 to 1.22. Skewness and kurtosis values between -2 and +2 are considered acceptable to demonstrate a normal univariate distribution (George & Mallery, 2010).

To determine the predictors of resilience, a multivariate linear regression analysis was performed using the backward method. In the model, the CD-RISC score was considered the dependent variable. Variables found to be significant in the bivariate analyses, including demographic characteristics (e.g., class level, perceived health status, regular physical exercise, duration of daily social media use, perception of security/reliability of the virtual environment) and VELS subscale scores (virtual socialization, virtual sharing, and virtual loneliness), were included as independent variables.

RESULTS

The demographic characteristics of the participants are summarized in Table 1. The mean age of the nursing students was 20.76±1.77 (min: 18-max: 29) years, with a vast majority being female (86.2%). The sample was distributed across all four years of study: first-year (33.5%), second-year (24.5%), third-year (20.7%), and fourth-year (21.3%). Regarding socioeconomic and living conditions, 69.1% reported an income equal to their expenses, and 73.9% lived with their families during the academic year. Most participants had lived in a province/city center for the longest period (78.7%), and 54.3% had graduated from public high schools.

In terms of health and lifestyle, 54.3% of students reported moderate sleep patterns, with a mean daily sleep duration of 7.32±1.56 hours. Regarding smoking status, 26.6% of students reported smoking. While 53.7% rated their general health status as moderate, only 40.4% engaged in regular physical exercise. Additionally, 15.4% reported having a chronic

Table 1. Sociodemographic and health-related characteristics of nursing students (n=188)

Characteristics	Number	Percent (%)
Mean age: 20.76±1.77 (min: 18–max:29)		
Gender		
Female	162	86.2
Male	26	13.8
School year/class		
First-year	63	33.5
Second year	46	24.5
Third year	39	20.7
Fourth-year	40	21.3
Income status		
Less than income	7	3.8
Income equal to expenses	130	69.1
More than expenses	51	27.1
Location of longest residence		
Village	6	3.2
District	33	17.6
Province/city center	148	78.7
Abroad	1	0.5
Graduated high school		
Public	102	54.3
Private	86	45.7
Place of living during university education		
Family	139	73.9
Alone	9	4.8
Private dorm	22	11.7
Government dorm	12	6.4
At home with friends/other	2	1.1
Daily sleep time: 7.32±1.56 (min:3 max: 15)		
Sleep patterns		
Good	43	22.9
Moderate	104	55.3
Poor	41	21.8
Smoking status		
Yes	50	26.6
No	138	73.4
Self-rated general health status		
Good	80	42.6
Moderate	101	53.7
Poor	7	3.7
Chronic disease condition		
Yes	29	15.4
No	159	84.6
Regular medication use		
Yes	24	12.8
No	164	87.2
Regular physical activity		
Yes	76	40.4
No	112	59.6
Having a hobby		
Yes	117	62.2
No	71	37.8

Min: Minimum, Max: Maximum

disease, and 62.2% participated in hobbies (e.g., reading books, listening to music, painting, and swimming) (Table 1). Additionally, 15.4% of participants reported having a chronic disease, 12.8% reported regular medication use, and 62.2% reported having a hobby.

The findings of the survey revealed that (Table 2) over half of the students (52.7%) perceived the virtual environment as moderately safe. The majority (54.8%) utilized social media for 3-5 hours per day. The primary purposes for internet access were online learning (59.7%) and research (55.9%). Most students (62.2%) used social media to follow friends. Primary motivations for virtual engagement included peer communication (25.7%), fun (20.7%), entertainment (16.5%), and alleviating boredom (16.2%).

Table 2. Virtual environment participation (n=188)

Virtual environment characteristics	Number	Percent (%)
Perception on security/reliability of virtual environment		
Very low	28	14.9
Low	46	24.4
Moderate	99	52.7
Reliable/secure	15	8.0
Using internet for online education		
Always	112	59.6
Generally	67	35.6
Sometimes	8	4.3
Rarely	1	0.5
Using internet for searching in online education		
Always	47	25
Generally	105	55.9
Sometimes	34	18.0
Rarely	2	1.1
Duration of daily usage of social media		
Less than hour	3	1.6
1-2 hour	43	22.9
3-5 hours	103	54.8
Over 6 hours	39	20.7
Reasons to use virtual environments such as social media* (n=246)		
Following fiends	153	62.2
To satisfy my curiosity	60	24.3
Popularity	33	13.5
Behaviors and motivations that are effective in using the virtual environment* (n=989)		
It allows me to communicate with my friends	254	25.7
Amuses me/having a good time	204	20.7
It satisfies my need for entertainment	164	16.5
Helps pass the time especially when I'm bored	162	16.2
It becomes a habit	111	11.3
The opportunity to influence people with my posts (photos etc.)	94	9.6

*Multiple answers were given

Mean scores of the VELS and the CD-RISC and its sub-dimensions were presented in Table 3.

The mean total VELS score was 58.44±11.87, with sub-dimension scores of 26.30±6.39 for virtual socialization, 15.39±7.13 for virtual sharing, and 16.74±4.54 for virtual loneliness. The mean total CD-RISC score was 65.29±15.38. Sub-dimension scores for resilience were: tenacity and personal competence (41.00±10.10), tolerance of negative affect (13.57±4.58), and tendency toward spirituality (10.71±2.74).

Table 3. The mean CD-RISC, VELS and subscale scores (n=188)

	Mean±SD	Range (min-max)	Range of possible scores (min-max)
Total VELS score	58.44±11.87	23-89	20-100
Virtual socialisation	26.30±6.39	8-40	8-40
Virtual sharing	15.39±7.13	7-35	7-35
Virtual Loneliness	16.74±4.54	5-25	5-25
CD-RISC	65.29±15.38	19-100	0-100
Tenacy and personal competence	41.00±10.10	9-60	0-60
Tolerance of negative affect	13.57±4.58	3-24	0-24
Tendency toward spirituality	10.71±2.74	4-16	0-16

CD-RISC: Connor-Davidson Resilience Scale, VELS: Virtual Environment Loneliness Scale, SD: Standard deviation, Min: Minimum, Max: Maximum

The comparison of the VELS and the CD-RISC subscale mean scores according to the socio-demographic characteristics were presented Table 4. No significant relationships were found between demographic variables and total VELS scores ($p>0.05$). However, significant differences were observed in resilience based on class year ($p=0.006$), and across all its sub-dimensions: tenacity ($p=0.022$), tolerance of negative affect ($p=0.002$), and spirituality ($p=0.004$). Furthermore, self-rated general health status was significantly associated with total CD-RISC scores ($p=0.002$), and its sub-dimensions of tenacity ($p=0.003$), and tolerance of negative affect ($p=0.006$).

Correlation analysis (Table 5) revealed weak positive correlations between CD-RISC total scores and both VELS total scores ($r = 0.165$, $p = 0.024$) and the virtual socialization subscale ($r = 0.252$, $p < 0.001$). No significant correlations were found between CD-RISC total scores and the virtual sharing or virtual loneliness subscales ($p > 0.05$).

A multivariate linear regression analysis was conducted to identify independent predictors of nursing students' resilience scores (Table 6). The model significantly predicted CD-RISC scores, with class level, regular physical exercise, and virtual socialization identified as significant predictors ($p<0.05$). Collectively, the independent variables in the model explained 19.1% of the total variance in resilience scores ($R^2=0.191$).

DISCUSSION

The Corona outbreak created a world of ambiguity, loss of control and uncertainty for everyone. Nursing students, as a part of society, like all people who experienced the pandemic, were affected by the threat they felt to an extent that would affect their psychological resilience and mental health, as well as the measures taken to protect them from the pandemic. In particular, as young adults, being away from home, social isolation practices, the transition to distance learning, the inability of students to use their face-to-face social support, the lack of leisure activities led students to spend more time in the virtual world (Grande et al., 2021; Pineda et al., 2022). The mobile phone has become an intermediary in interpersonal contacts, and social media has replaced the real world of peer and social relationships (Szeto et al., 2024).

Table 4. Comparison of CD-RISC and VELS total and subscale scores according to sociodemographic characteristics (n=188)

Socio-demographic characteristics	CD-RISC mean±SD	Tenancy & personal competence mean±SD	Tolerance of negative affect mean±SD	Tendency toward spirituality mean±SD	VELS mean±SD	Virtual socialisation mean±SD	Virtual sharing mean±SD	Virtual loneliness
Gender								
Female	64.85±15.40	40.74±10.23	13.34±4.47	10.75±2.73	58.32±12.09	26.37±6.46	15.04±7.00	16.89±4.45
Male	68.03±15.25	42.61±9.28	15.00±5.11	10.42±2.87	59.15±10.57	25.80±6.05	17.53±7.67	15.80±5.03
p-value	0.328	0.383	0.088	0.564	0.74	0.67	0.09	0.25
Class								
First[1]	61.65±14.66	39.65±9.85	12.28±4.30	9.71±2.71	57.87±12.07	26.34±6.43	13.98±6.82	17.53±4.02
Second[2]	62.43±16.53	38.39±11.20	13.04±4.77	11.0±2.78	58.31±9.65	25.54±5.34	16.45±6.68	16.23±4.26
Third[3]	69.07±15.60	43.74±9.68	14.15±4.86	11.17±2.81	60.92±13.46	27.15±7.02	17.43±7.45	16.33±4.95
Fourth[4]	70.62±12.85	43.47±8.61	15.65±4.58	11.50±2.74	57.12±12.30	26.25±6.89	14.40±7.37	16.47±5.17
p-value	0.006 (1<3.4; 2<3.4)	0.022 (1<3; 2<3.4)	0.002 (1<4; 2<4)	0.004 (1<3.4)	0.50	0.72	0.05	0.40
Self-rated general health status								
Good[1]	68.43±16.14	43.06±10.2	14.32±4.72	11.05±3.02	58.55±12.63	27.01±6.66	14.83±7.56	16.90±4.68
Moderate[2]	61.98±14.04	38.88±9.56	12.72±4.25	10.37±2.55	58.19±10.81	25.73±6.00	15.59±6.65	16.86±4.13
Poor[3]	77.14±13.17	48.14±8.00	17.28±4.88	11.71±1.38	60.71±18.38	28.57±6.95	18.85±8.68	13.29±7.48
p-value	0.002 (1<3; 2<3)	0.003 (1<3; 2<3)	0.006 (1<3; 2<3)	0.162	0.858	0.336	0.332	0.121

*p<0.05. CD-RISC: Connor-Davidson Resilience Scale, VELS: Virtual Environment Loneliness Scale, SD: Standard deviation

Table 5. CD-RISC and VELS correlation

Scale and subscales	Test	CD-RISC	Tenacy&personal competence	Tolerance of negative affect	Tendency toward spirituality
VELS	r	0.165*	0.116	0.193**	0.175*
	p	0.024	0.114	0.008	0.016
Virtual socialization	r	0.252**	0.308**	0.180*	0.318**
	p	<0.001	0.000	0.013	0.000
Virtual sharing	r	0.087	0.013*	0.178*	0.141
	p	0.235	0.856	0.014	0.053
Virtual loneliness	r	-0.062	-0.052	-0.030	0.013
	p	0.402	0.477	0.684	0.161

**p<0.001,* p<0.05. CD-RISC: Connor-Davidson Resilience Scale, VELS: Virtual Environment Loneliness Scale

Table 6. Multiple linear regression model predicting CD-RISC Scores

Independent variable: CD-RISC Score						
Predictors	**B**	**SE**	**Beta**	**t**	**p**	**VIF**
Constant	65.584	8.077		8.120	0.000	
Class	3.046*	0.926	0.227	3.290	0.001	1.020
Self-rated general health status	-6.336	3.428	-0.149	-1.848	0.066	1.399
Regular physical exercise	-6.462	2.198	-0.207	-2.940	0.004	1.360
Duration of daily usage of social media	-1.866	1.512	-0.008	-0.106	0.915	1.155
Perception on security/reliability of virtual environment	-0.142	1.339	-0.008	0.116	0.910	1.045
Virtual socialization	0.703*	0.188	0.292	3.732	0.001	1.318
Virtual sharing	-0.078	0.170	-0.036	-0.461	0.646	1.337
Virtual loneliness	-0.272	0.262	-0.080	-1.039	0.300	1.287

*R=0.407; R^2=0.191; Adjusted R^2=0.154; F=4.457; Durbin Watson=1.613. p<0.001. CD-RISC: Connor-Davidson Resilience Scale, SE: Standard error, VIF: Variance inflation factor

Findings revealed that mean scores for virtual environment loneliness across all subscales were at a moderate level. Notably, the "virtual socialization" mean score was higher than other sub-dimensions, suggesting that students actively utilized digital spaces to compensate for physical isolation. While literature specifically addressing "virtual loneliness" in nursing students during COVID-19 is emerging, our results align with broader studies on loneliness. Kupcewicz et al. (2022) found moderate loneliness levels among nursing students in Poland, Spain, and Slovakia during the COVID-19 pandemic, identifying life satisfaction as a primary predictor. Similarly, research in the Middle East and Turkiye has demonstrated a significant correlation between increased internet usage, smartphone addiction, and loneliness (Alheneidi et al., 2021;

Sönmez et al., 2021). Our study supports these findings, as the majority of participants identified peer communication and socialization as their primary motivations for virtual engagement.

It was determined that the mean score of the nursing students' CD-RISC and sub-dimension mean scores which are tenancy and personal competence, tolerance of negative affect and tendency toward spirituality are at moderate level. These results mirror findings from other regions; for example, students in Southeast Turkiye (Dirgar et al., 2022) and the Philippines also reported moderate resilience during the pandemic (Labrague et al., 2021). However, our results contrast with some data from China, where nursing students exhibited higher resilience levels; found that self-directed learning has played a mediating role in the relationship between caring and resilience among Chinese nursing students (Zhou et al., 2022). These variations may stem from differences in regional pandemic severity, cultural coping mechanisms, or the level of institutional support provided during the transition to online learning.

Although students who engaged in regular physical exercise demonstrated higher resilience scores in bivariate analyses, this variable did not remain significant in the multivariate regression model. The relationship between exercise and resilience is well-documented at a biological level. Physical activity promotes the secretion of neurotransmitters and endorphins, which can induce a sense of well-being and act as a buffer against stressful events. Furthermore, regular exercise enhances an individual's self-perception of competence and worth (Lancaster & Callaghan, 2022). The high Tenacity & Personal Competence subscale score observed in the regular physical exercise group supports this conclusion.

In this study, correlation analysis revealed a weak but significant positive relationship between resilience and total VELS scores. Among the VELS subscales, virtual socialization showed a significant positive correlation with resilience, whereas virtual sharing and virtual loneliness were not significantly correlated with resilience. These findings suggest that students who actively participate in online social interactions may benefit from increased social support and a sense of belonging, which may positively contribute to their resilience levels. Previous studies have reported that social support and interpersonal interaction are important factors that strengthen resilience (Holmes et al., 2020; Li et al., 2022). Similarly, studies conducted with nursing students have indicated that digital social connections may support psychological well-being and facilitate coping with stress (Aryuwat et al., 2023; Park & Choi, 2025).

In the regression analysis, class level, regular physical exercise, and virtual socialization were identified as significant predictors of resilience. Higher class levels were associated with greater resilience. This finding may be explained by students' increasing clinical experience, the development of more effective coping strategies, and improved adaptation to academic challenges over time. Previous studies have similarly reported that resilience tends to increase with academic progression and clinical exposure among nursing students, as senior students often develop stronger coping skills and greater professional confidence (Aryuwat et al., 2023; Labrague, 2021; Reyes et al., 2015).

Limitations

This study has several limitations that should be considered when interpreting the results. First, the data were collected from a single nursing school, which may limit the generalizability of the findings to students in different geographic or institutional contexts. Second, the use of self-report instruments introduces the possibility of social desirability bias or subjective interpretation of the questions. Finally, due to the cross-sectional design, we cannot establish a definitive causal relationship between virtual habits and resilience over time.

CONCLUSION

This study underscores the intricate relationship between digital engagement, virtual loneliness, and psychological resilience among nursing students during a global crisis. While virtual environments served as essential tools for education and social continuity during the COVID-19 pandemic, they also introduced the risk of virtual loneliness. Our findings indicate that resilience among nursing students appears to be influenced by year of study and positive virtual socialization behaviors.

The moderate levels of virtual loneliness observed suggest that while digital platforms facilitate a sense of connection, they may not fully replace the protective effects of traditional social integration. Ultimately, fostering resilience must be viewed as a systemic necessity rather than an individual responsibility. Given that resilience scores varied significantly by school year, nursing curricula should include longitudinal resilience-building programs. Early-stage students may require more intensive support as they adapt to the rigors of the profession, while senior students can benefit from mentorship roles that reinforce their personal competence. Furthermore, as nursing students transition into high-pressure clinical environments, understanding these psychological dynamics is crucial for ensuring their long-term professional success and well-being. Given that regular physical exercise was a significant predictor of resilience, nursing programs should actively promote physical health. Educators should address "virtual loneliness" by teaching students how to use digital tools mindfully. Incorporating discussions on the difference between "virtual sharing" and "authentic social support" can help students avoid the pitfalls of digital withdrawal.

ETHICAL DECLARATIONS

Ethics Committee Approval

This study was conducted with the approval of the Başkent University Ethics Committee of the Academic Evaluation Coordination Office (Date: 08.04.2021, Decision No: 2021/25610).

Informed Consent

Written informed consent was obtained from all individual participants prior to their inclusion in the study. Participants were fully informed about the study's aims, procedures, potential risks and benefits, and their rights-including the right to withdraw at any time without consequence. All participants voluntarily signed a written informed consent form.

Peer Review Process

This manuscript was subject to external peer review.

Conflict of Interest

The authors declare no conflicts of interest related to this study.

Financial Disclosure

The authors received no financial support for the conduct or publication of this research.

Author Contributions

Concept: SK, İÖ, EAÇ, MŞ, ÖD, BÇ; Design: SK, İÖ; Control: SK, İÖ, MŞ, ÖD; Data Collection and/or Processing: İÖ, MŞ, ÖD; Analysis and/or Interpretation: SK, BÇ, EAÇ; Literature Review: SK, EAÇ, MŞ, İÖ; Article Writing: SK, BÇ, EAÇ; Critical Review: SK, BÇ, EAÇ.

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