

RESEARCH ARTICLE

A cross-sectional study of nursing students' eHealth literacy and COVID-19 preventive behaviours

Kyoung-A Kim¹ | Myung Sun Hyun² | Jennie C. De Gagne³  | Jeong-Ah Ahn² 

¹College of Nursing, Gachon University, Incheon, South Korea

²College of Nursing and Research Institute of Nursing Science, Ajou University, Suwon, South Korea

³Duke University School of Nursing, Durham, North Carolina, USA

Correspondence

Jeong-Ah Ahn, College of Nursing and Research Institute of Nursing Science, Ajou University, Worldcup-ro 164, Yeongtong-gu, Suwon 16499, South Korea.

Email: ahnj@ajou.ac.kr

Funding information

Ajou University, Grant/Award Number: 2021

Abstract

Aim: This study explored nursing students' eHealth literacy, lifestyle behaviours and COVID-19-related preventive behaviours and associated factors.

Design: A cross-sectional comparative correlational study.

Methods: Nursing students ($n = 358$) from a metropolitan area of South Korea were recruited for an online survey. The online questionnaire included: The eHealth Literacy Scale, the Health Promoting Lifestyle Profile-II and the COVID-19-related preventive behaviour scale.

Results: COVID-19-related preventive behaviours correlated positively with satisfaction with one's major, time spent seeking health information online, eHealth literacy and lifestyle behaviours. Significant factors affecting COVID-19-related preventive behaviours were the following: being female ($\beta = 0.194, p < .001$), time spent seeking health information online ($\beta = 0.114, p = .002$), eHealth literacy ($\beta = 0.167, p = .001$) and lifestyle behaviours ($\beta = 0.266, p < .001$).

Conclusions: Findings highlight the need to strengthen searching behaviours to access accurate health information online and reinforce eHealth literacy and health-promoting lifestyle behaviours to improve COVID-19 preventive behaviours among nursing students.

KEYWORDS

COVID-19, eHealth literacy, health behaviour, nursing students

1 | BACKGROUND

The onset of the COVID-19 pandemic increased interest in exchanging and communicating health-related information through online social networks, which offer a more readily available source of information than offline methods (Song et al., 2016). The internet is a convenient and cost-effective method of obtaining health information and is easy for most people to use (Newman et al., 2019). College students are familiar with searching for information and solutions on the internet or a smartphone (Kim et al., 2016). As a result of

social distancing measures implemented due to the COVID-19 pandemic, college students have increasingly searched for health- and pandemic-related information online at home or in personally comfortable places rather than in their college or public library.

Although college students expect to obtain quality information from online searches, internet media may deliver false or manipulated information (Buchanan, 2020). Therefore, it is critical to ensure that college students access appropriate online media when searching for quality information that can affect their health and medical conditions and behaviours. In addition, for young adults, the college

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2022 The Authors. *Nursing Open* published by John Wiley & Sons Ltd.

years are a period of transition from adolescence to adulthood; thus, health-related information obtained during this period can have critical impacts on their lifelong health behaviours (Edelman & Kudzma, 2018). Nursing students must have accurate health information and develop a healthy lifestyle in order to provide quality health education to patients and the public and model appropriate health behaviours, including preventative behaviours, in their future role as nurses (Park et al., 2018).

The unprecedented conditions of the COVID-19 pandemic have fuelled interest in the efficient communication of accurate health information and its use in addressing individuals' protective and preventative health behaviours. In previous studies, diverse factors associated with COVID-19 preventive health behaviour were suggested including individual characteristics (i.e. gender and age), prior lifestyle behaviours, educational needs, accessibility to disease-information sources and health literacy (Jung & Kim, 2022; Sánchez-Arenas et al., 2021).

eHealth literacy has been defined as the essential ability to explore, understand, evaluate and utilize internet health information (Norman & Skinner, 2006). In recent years, health care providers and researchers have become substantially more interested in eHealth literacy and its influence on the health status and behaviours of users of online information. Although online communication has been a primary source of health and preventative information during the COVID-19 pandemic, the influence of eHealth literacy on preventative behaviours during the COVID-19 pandemic has not been identified. College students need the ability to access information about COVID-19 and related preventive behaviours as this ability may affect rates of COVID-19 infection and related health outcomes in their college setting as well as potentially impacting their families and communities (Patil et al., 2021).

1.1 | Research question

In this study, we aimed to investigate eHealth literacy, lifestyle behaviours and COVID-19-related preventive behaviours of nursing students and explore the factors associated with COVID-19-related preventive behaviours.

2 | METHODS

2.1 | Design and participants

The present study used a cross-sectional comparative correlational study design. A total of 680 nursing students from two universities in a metropolitan area of South Korea were invited to participate in an online survey. Participants were included if they were nursing students over age 18 who were willing to participate in the study. Data were collected from April to May 2021. The final sample included 358 students who completed the online survey, representing a dropout rate of 47.4%. Using the G*Power 3.1.2 software program

for a post hoc analysis of regression, the sample size of this study reached a power ($1-\beta$) of 99.9%, with a conventional medium effect size of 0.15, an alpha value of 0.05 and five as the number of independent variables (Faul et al., 2009).

2.2 | Measures

Participants completed a self-administered questionnaire that surveyed sociodemographic characteristics, eHealth literacy, lifestyle behaviours and COVID-19-related preventive behaviours. eHealth literacy was measured using the eHealth Literacy Scale (eHEALS) developed by Norman and Skinner (2006), which consists of 8 items measuring attitude towards the internet with answers provided on a 5-point Likert scale (1 = *absolutely disagree* to 5 = *absolutely agree*). Total scores for the scale ranged between 8 and 40, with higher scores denoting a higher level of eHealth literacy. The eHEALS was validated as a valid and reliable measure in Korean young adults via content analysis in a previous study. Both individual content validity index (CVI) and scale CVI were reported acceptable (individual CVIs >0.67; scale CVI = 0.83) (Chung et al., 2018). Cronbach's alpha in a previous study was 0.88 (Chung et al., 2018), and it was 0.92 in this study.

Lifestyle behaviours were measured using the Health Promoting Lifestyle Profile-II (HPLP-II) developed by Walker et al. (1995). It consists of 52 items and six domains: (1) Health Responsibility, (2) Physical Activity, (3) Nutrition, (4) Spiritual Growth, (5) Interpersonal Relations and (6) Stress Management. The HPLP-II uses a 4-point rating scale (1 = *never* to 4 = *routinely*), with higher scores denoting better lifestyle behaviours. The construct validity of the HPLP-II was validated via confirmatory factor analysis in a previous study (Jo & Bang, 2018). Cronbach's alpha in a previous study for Korean university students was 0.91 (Bang et al., 2018), and it was 0.94 in this study.

COVID-19-related preventive behaviours were measured using a modified instrument developed by Park et al. (2021). The original tool consists of 10 items, however, the authors excluded 2 items asking infodemic behaviours (producing and sharing information) since these were not considered direct preventive behaviours for COVID-19. Thus, the instrument we used in the study consists of 8 items addressing hand hygiene (frequency and methods), mobile phone hygiene, wearing masks (frequency, method and not touching the surface), coughing etiquette and social distancing. Each item was rated on a 5-point scale (1 = *not at all* to 5 = *all the time*), with higher scores reflecting better preventive behaviours. The validity of the original tool was confirmed (scale CVI/Ave = 0.79), and Cronbach's alpha was 0.52 in the original study for Korean university students (Park et al., 2021). Cronbach's alpha of the modified instrument was 0.64 and inter-item correlations were between 0.129 and 0.564 in this study.

2.3 | Data analysis

Data were analysed using SPSS version 25.0 (IBM Corporation, Armonk, NY, USA). Descriptive statistics were calculated for

participants' sociodemographic characteristics, eHealth literacy, lifestyle behaviours and COVID-19-related preventive behaviours. Independent sample t-tests, ANOVA and Scheffé tests were used to explore the differences in eHealth literacy, lifestyle behaviours, and COVID-19-related preventive behaviours by sociodemographic characteristics. Pearson's correlation coefficients were calculated to identify relationships between COVID-19-related preventive behaviours and other study variables. Lastly, in order to examine the factors influencing COVID-19-related preventive behaviours, a multiple linear regression analysis with enter method was conducted including significant variables in the preceding univariate analyses.

2.4 | Ethical considerations

This study was approved by the Institutional Review Boards of Ajou University (IRB no. AJIRB-SBR-SUR-21-070). Participants' informed consent was obtained online after they were told the study's purpose and about the confidentiality of their data. Anonymity was ensured by the suppressed encoding of each participant's name.

3 | RESULTS

3.1 | Participants' sociodemographic characteristics

The sociodemographic characteristics of the 358 participants are presented in Table 1. The nursing students had a mean age of 20.9 years (range: 18–29), and 83.8% were female. Most of the students lived with their families, and 86.3% responded that they had never smoked. Subjective health status, satisfaction with major and satisfaction with campus life had mean scores of 3.51, 4.01 and 3.51, respectively (range: 1–5). Students reported that their primary health information resource was the internet (45.8%), and their average time spent seeking health information online was 57.60 min per week.

3.2 | Participants' eHealth literacy, lifestyle behaviours and COVID-19-related preventive behaviours

The means, standard deviations, medians and modes of study variables are presented in Table 2. The total mean scores of eHealth literacy, lifestyle behaviours and COVID-19-related preventive behaviours of the participants were 30.08 (range: 11–40), 2.41 (range: 1–4) and 3.69 (range: 1–5), respectively. The lifestyle behaviours domain that had the highest mean score was interpersonal relations (mean = 2.81), followed by spiritual growth (mean = 2.61), and stress management (mean = 2.48). On the other hand, health responsibility (mean = 2.01) had the lowest score, followed by physical activity (mean = 2.14) and nutrition (mean = 2.38). For the COVID-19-related

TABLE 1 Participants' sociodemographic characteristics (n = 358)

Variables	Categories	n (%) or mean (SD)
Gender	Male	58 (16.2)
	Female	300 (83.8)
Age (years) (range: 18–29)		20.92 (2.35)
Grade	1st year	102 (28.5)
	2nd year	93 (26.0)
	3rd year	82 (22.9)
	4th year	81 (22.6)
Living arrangement	Living with family	233 (65.1)
	Living with friends	70 (19.6)
	Living alone	55 (15.4)
Religion	Yes	145 (40.5)
	No	213 (59.5)
Alcohol consumption	Yes	199 (55.6)
	No	159 (44.4)
Smoking	Current smoker	26 (7.3)
	Ex-smoker	23 (6.4)
	Never	309 (86.3)
Subjective health status (range: 1–5)		3.51 (0.89)
Satisfaction with major (range: 1–5)		4.01 (0.72)
Satisfaction with campus life (range: 1–5)		3.51 (0.84)
Time spent seeking health information online (min/week)		57.60 (68.81)
Health information resource ^a	Internet	164 (45.8)
	Mass media	76 (21.2)
	Family or friends	68 (19.0)
	Healthcare professionals	38 (10.6)
	Handouts	7 (2.0)
	Others	5 (1.4)

^aDuplicated response.

preventive behaviours, wearing masks (mean = 4.47) and hand hygiene (mean = 4.38) were ranked the highest, whereas social distancing (mean = 2.65) and mobile phone hygiene (mean = 3.44) were ranked the lowest.

3.3 | Differences in eHealth literacy, lifestyle behaviours and COVID-19-related preventive behaviours according to the sociodemographic characteristics

Differences in study variables associated with the sociodemographic characteristics were examined using comparison analysis (see Table 3). Results indicated that 4th-year students had significantly

TABLE 2 Means and standard deviations of study variables ($n = 358$)

Variables and domains	Number of items	Mean (SD)	Median	Mode
eHealth literacy (range: 11–40)	8	30.08 (5.07)	30.00	32.00
Lifestyle behaviours (range: 1–4)	52	2.41 (0.43)	2.38	2.29
Health responsibility	9	2.01 (0.57)	1.89	1.89
Physical activity	8	2.14 (0.71)	2.00	1.75
Nutrition	9	2.38 (0.50)	2.33	2.33
Spiritual growth	9	2.61 (0.61)	2.56	2.44
Interpersonal relations	9	2.81 (0.47)	2.78	2.56
Stress management	8	2.48 (0.50)	2.50	2.38
COVID-19-related preventive behaviours (range: 1–5)	8	3.69 (0.41)	3.70	3.70
Hand hygiene	2	4.38 (0.72)	4.50	5.00
Mobile phone hygiene	1	3.44 (1.24)	3.00	3.00
Wearing masks	3	4.47 (0.47)	4.66	4.67
Coughing etiquette	1	4.27 (1.08)	5.00	5.00
Social distancing	1	2.65 (0.98)	2.00	2.00

higher eHealth literacy scores than 1st-year students ($p = .012$). Female students scored significantly higher COVID-19-related preventive behaviours than their counterparts ($p = .019$). None of the sociodemographic characteristics were significantly related to lifestyle behaviours.

3.4 | Correlations between the study variables

Correlations were performed between the continuous sociodemographic variables, eHealth literacy, lifestyle behaviours, and COVID-19-related preventive behaviours (see Table 4). COVID-19-related preventive behaviours were significantly related to nursing students' satisfaction with their major ($r = 0.133$, $p < .05$), time spent seeking health information online ($r = 0.107$, $p < .05$), eHealth literacy ($r = 0.229$, $p < .001$) and lifestyle behaviours ($r = 0.283$, $p < .001$).

3.5 | Factors associated with COVID-19-related preventive behaviours

The factors significantly associated with COVID-19-related preventive behaviours are shown in Table 5. A multiple regression analysis was performed with gender, satisfaction with major, time spent seeking health information online, eHealth literacy and lifestyle behaviours as independent variables in order to identify the factors predicting COVID-19-related preventive behaviours. Overall regression model for these variables predicting COVID-19-related preventive behaviours in the participants was significant ($F = 12.73$, $p < .001$), with an adjusted R^2 of 0.141 (i.e. the explanatory power of 14.1%). The factor most strongly related to COVID-19 preventive behaviours was found to be lifestyle behaviours ($\beta = 0.266$, $p < .001$), followed by female gender ($\beta = 0.194$, $p < .001$), eHealth

literacy ($\beta = 0.167$, $p = .001$) and time spent seeking health information online ($\beta = 0.114$, $p = .002$).

4 | DISCUSSION

This cross-sectional, correlational study investigated the eHealth literacy, lifestyle behaviours and COVID-19-related preventive behaviours of nursing students. It also explored the factors associated with COVID-19-related preventive behaviours. The average score for COVID-19-related preventive behaviours among nursing students was 3.69 out of 5, with the Wearing Masks subscale having the highest score (4.47 out of 5). This result was consistent with a previous study that used the same instrument with a sample of university students (Park et al., 2021). The importance of wearing masks in public during the COVID-19 pandemic has been emphasized, and the practice of wearing masks as an essential method for preventing the spread of the disease has become a daily routine for university students (Jayaweera et al., 2020). However, the mean social distancing subcategory score was the lowest (2.65 out of 5) in this study. Although social distancing measures are essential protective behaviours to control the spread of the virus (Economou, 2021), young university students' awareness of social distancing seems relatively low and difficult to maintain as they are particularly active and social (Rieger, 2020). Providing consistent health education messaging online that emphasizes the importance of social distancing as a method of infection control among young university students is important to reduce the further spread of the virus.

In this study, nursing students' COVID-19-related preventive behaviours were associated with their gender, time spent seeking health information online, eHealth literacy and lifestyle behaviours. First, gender was significantly associated with COVID-19-related preventive behaviours; female nursing students reported significantly

TABLE 3 Differences in study variables according to sociodemographic characteristics

Variables	Categories	eHealth literacy			Lifestyle behaviours			COVID-19-related preventive behaviours		
		Mean (SD)	t/F	p (Scheffé)	Mean (SD)	t/F	p (Scheffé)	Mean (SD)	t/F	p (Scheffé)
Gender	Male	30.03 (5.40)	-0.08	.936	2.49 (0.44)	1.67	.095	3.57 (0.39)	-2.35	.019
	Female	30.09 (5.02)			2.39 (0.42)			3.71 (0.41)		
Grade	1st ^a	29.07 (5.40)	3.71	.012	2.42 (0.45)	0.20	.900	4.28 (0.47)	0.38	.767
	2nd ^b	30.09 (4.67)		(a < d)	2.42 (0.39)			4.25 (0.52)		
	3rd ^c	29.90 (5.18)			2.41 (0.46)			4.24 (0.49)		
	4th ^d	31.54 (4.72)			2.38 (0.39)			4.31 (0.42)		
Living arrangement	Living with family	29.99 (4.95)	2.18	.155	2.42 (0.42)	0.35	.706	3.71 (0.42)	1.84	.160
	Living with friends	31.07 (5.02)			2.37 (0.42)			3.64 (0.38)		
	Living alone	29.21 (5.52)			2.41 (0.43)			3.61 (0.37)		
Religion	Yes	30.16 (5.20)	0.23	.818	2.46 (0.46)	1.91	.057	4.27 (0.49)	-0.18	.859
	No	30.03 (4.99)			2.37 (0.40)			4.27 (0.47)		
Alcohol drinking	Yes	29.90 (5.13)	-0.77	.443	2.41 (0.40)	2.56	.798	3.65 (0.37)	-1.76	.079
	No	30.31 (5.00)			2.40 (0.45)			3.73 (0.44)		
Smoking	Current smoker	30.65 (4.86)	2.46	.087	2.44 (0.49)	0.08	.926	3.69 (0.41)	1.10	.334
	Ex-smoker	27.87 (6.93)			2.39 (0.40)			3.56 (0.35)		
	Never	30.20 (4.91)			2.40 (0.42)			3.69 (0.41)		

TABLE 4 Correlations between study variables

Variables	1	2	3	4	5	6	7
1. Subjective health status	1						
2. Satisfaction with major	0.219**	1					
3. Satisfaction with campus life	0.192*	0.473**	1				
4. Time spent seeking health information online	0.004	0.002	0.001	1			
5. eHealth literacy	0.032	0.117**	0.177*	0.033	1		
6. Lifestyle behaviours	0.307**	0.296**	0.296**	0.033	0.237**	1	
7. COVID-19-related preventive behaviours	0.030	0.133*	0.092	0.107*	0.229**	0.283**	1

* $p < .05$.** $p < .001$.

TABLE 5 Factors associated with COVID-19-related preventive behaviours

Variables	B	SE	β	t (p)
(Constant)	2.650	0.219		12.07 (<.001)
Female ^a	0.251	0.064	0.194	3.89 (<.001)
Satisfaction with major	-0.017	0.029	-0.029	-0.56 (.574)
Time spent seeking health information online	0.001	0.001	0.114	2.30 (.002)
eHealth literacy	0.016	0.005	0.167	3.28 (.001)
Lifestyle behaviours	0.299	0.059	0.266	5.04 (<.001)

$R^2 = 0.153$, adjusted $R^2 = 0.141$, $F = 12.73$, $p < .001$

^aDummy variable reference: Male.

higher levels of COVID-19-related preventive behaviours than male students. Little is known about patterns of implementing COVID-19-related preventive behaviours by demographic characteristics, including gender; however, females have generally been reported to be more cautious and likely to engage in preventive behaviours than men (Smail et al., 2021). Future research should expand the understanding of how diverse sociodemographic characteristics, including gender, are associated with COVID-19 preventive behaviours.

Previously, compliance with COVID-19 preventive recommendations was shown to be significantly associated with online media consumption and eHealth literacy (Grossman et al., 2020). Sharing of health information and provision of health education have increased online recently compared with offline during the COVID-19 crisis (OECD, 2021). Moreover, the use of online platforms related to health increased markedly during the first half of 2020, when most countries imposed a lockdown (OECD, 2021). The role of online platforms for the distribution of health information should be strengthened with appropriate policies regarding digital preparedness and resilience to ensure future positive impacts on society (OECD, 2021). Another study found that higher digital health (eHealth) literacy significantly predicted COVID-19-related behaviours in US college students (Patil et al., 2021). Recently, researchers have emphasized that eHealth literacy should be included as a mandatory topic in university curricula (Maddock & Moore, 2020). More importantly, nursing students are trained to become health care professionals, which

suggests that eHealth literacy and related education is essential for their personal and future patient-centred care (Sharma et al., 2019).

Appropriate daily health behaviours can significantly affect an individual's motivation and efforts regarding health promotion and prevention against certain disease states (e.g. response to the COVID-19 pandemic) (Teyhen et al., 2018). The COVID-19 pandemic and resulting "Stay-at-Home" mandates had a profound impact on health-promoting lifestyle behaviours, both positive (e.g. sleep and physical activity) and negative (e.g. alcohol consumption, substance abuse and smoking) in young people (Czenczek-Lewandowska et al., 2021; Knell et al., 2020); therefore, college students' daily health-promoting behaviours need to be strengthened to support COVID-19 preventive behaviours.

Lacking preventive behaviours of COVID-19 has been related to the lack of knowledge and an increased likelihood for high-risk behaviours (Firouzbakht et al., 2021). Thus, improving knowledge, such as eHealth literacy, and promoting health behaviours are critical solutions that could prevent the spread of COVID-19 infections. Education for nursing students as important future health professionals to increase eHealth literacy and promote positive health behaviours should help society avoid another public health crisis that may occur in the future and limit the further spread of COVID-19.

There are several limitations to the generalization of our results. First, the sample selected from one metropolitan area in

South Korea may not represent the population. Second, Cronbach's alpha of the modified version of COVID-19-related preventive behaviours questionnaire was 0.64 in this study while Cronbach's alpha of original instrument was 0.52 (Park et al., 2021), which meant low reliability of the tool. Third, it is necessary to be cautious in interpreting the results since the study reported small statistical values for comparisons and correlations (i.e. low correlation coefficients and adjusted R^2) although they were reported with significant p -values. Further studies on diverse populations are needed, along with consideration of appropriate sample size and psychometric analyses to verify the reliability and validity of the instrument.

5 | CONCLUSION

Our study showed that COVID-19-related preventive behaviours among nursing students were significantly related to students' gender, time spent seeking health information online, eHealth literacy and lifestyle behaviours. These findings provide evidence that teaching nursing students to search effectively for appropriate health information online, reinforcing their eHealth literacy, and supporting their health-promoting behaviours could improve their COVID-19 preventive behaviours. It is also necessary to understand the multifaceted-related factors of nursing students, as future pivotal healthcare professionals, in order to promote the preventive behaviours during the pandemic situation worldwide.

AUTHOR CONTRIBUTIONS

Myung Sun Hyun and Jeong-Ah Ahn contributed to study design. Kyoung-A Kim, Myung Sun Hyun and Jeong-Ah Ahn collected the data. Kyoung-A Kim and Jeong-Ah Ahn analysed the data, prepared the first draft and wrote the manuscript. Myung Sun Hyun and Jennie C. De Gagne interpreted data for the work and critically revised the manuscript. Jeong-Ah Ahn contributed to funding acquisition. All authors approved the final manuscript and agreed to be accountable for all aspects of the work.

ACKNOWLEDGEMENT

The authors would like to thank all the students who voluntarily participated in this study.

FUNDING INFORMATION

This research was supported by research grant in 2021 from the Department of Nursing Science, Graduate School, Ajou University.

CONFLICT OF INTEREST

The authors have no competing or conflicting interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ETHICAL APPROVAL

Institutional review board approval (AJIRB-SBR-SUR-21-070).

ORCID

Jennie C. De Gagne  <https://orcid.org/0000-0001-9814-5942>

Jeong-Ah Ahn  <https://orcid.org/0000-0002-8293-5349>

REFERENCES

- Bang, K. S., Song, M. K., Park, S. E., & Kim, H. (2018). Relationships among physical activity level, health-promoting behavior, and physiological variables in Korean university students. *Perspectives in Nursing Science*, 15(1), 11–17. <https://doi.org/10.16952/pns.2018.15.1.11>
- Buchanan, T. (2020). Why do people spread false information online? The effects of message and viewer characteristics on self-reported likelihood of sharing social media disinformation. *PLoS One*, 15(10), e0239666. <https://doi.org/10.1371/journal.pone.0239666>
- Chung, S., Park, B. K., & Nahm, E. S. (2018). The Korean eHealth literacy scale (K-eHEALS): Reliability and validity testing in younger adults recruited online. *Journal of Medical Internet Research*, 20(4), e138. <https://doi.org/10.2196/jmir.8759>
- Czenczek-Lewandowska, E., Wyszynska, J., Leszczak, J., Baran, J., Weres, A., Mazur, A., & Lewandowski, B. (2021). Health behaviours of young adults during the outbreak of COVID-19 pandemic: A longitudinal study. *BMC Public Health*, 21(1), 1038. <https://doi.org/10.1186/s12889-021-11140-w>
- Economou, M. (2021). Social distance in COVID-19: Drawing the line between protective behavior and stigma manifestation. *Psychiatriki*, 32(3), 183–186. <https://doi.org/10.22365/jpsych.2021.025>
- Edelman, C. L., & Kudzma, E. C. (2018). *Health promotion throughout the life span* (9th ed.). Elsevier.
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*power 3.1: Test for correlation and regression analyses. *Behavior Research Methods*, 41, 1149–1160.
- Firouzbakht, M., Omidvar, S., Firouzbakht, S., & Asadi-Amoli, A. (2021). COVID-19 preventive behaviors and influencing factors in the Iranian population: A web-based survey. *BMC Public Health*, 21(1), 143. <https://doi.org/10.1186/s12889-021-10201-4>
- Grossman, G., Kim, S., Rexer, J., & Thirumurthy, H. (2020). Political partisanship influences behavioral responses to governors' recommendations for Covid-19 prevention in the United States. *Proceedings of the National Academy of Sciences*, 117(39), 24144–24153.
- Jayaweera, M., Perera, H., Gunawardana, B., & Manatunge, J. (2020). Transmission of COVID-19 virus by droplets and aerosols: A critical review on the unresolved dichotomy. *Environmental Research*, 188, 109819. <https://doi.org/10.1016/j.envres.2020.109819>
- Jo, J., & Bang, K. S. (2018). The effect of health promoting behavior on stress among resort workers. *Korean Journal of Occupational Health Nursing*, 27(2), 99–108. <https://doi.org/10.5807/KJOHN.2018.27.2.99>
- Jung, Y. M., & Kim, N. Y. (2022). Factors affecting preventive health behaviors against COVID-19 in nursing students: A cross-sectional study. *International Journal of Environmental Research & Public Health*, 19(9), 5496. <https://doi.org/10.3390/ijerph19095496>
- Kim, N. S., Lee, K. E., & Son, H. J. (2016). Comparison of health consciousness and smart-phone literacy according to the type of health information seeking behavior on the internet among one university students. *Journal of Health Informatics & Statistics*, 41(1), 112–122. <https://doi.org/10.21032/jhis.2016.41.1.112>
- Knell, G., Robertson, M. C., Dooley, E. E., Burford, K., & Mendez, K. S. (2020). Health behavior changes during COVID-19 pandemic and subsequent "stay-at-home" orders. *International Journal of Environmental Research & Public Health*, 17(17), 6268. <https://doi.org/10.3390/ijerph17176268>

- Maddock, J. E., & Moore, J. B. (2020). Should public health literacy be a core requirement for college students? *Journal of Public Health Management & Practice*, 26(4), 304–305. <https://doi.org/10.1097/PHH.0000000000001187>
- Newman, K., Wang, A. H., Wang, A. Z. Y., & Hanna, D. (2019). The role of internet-based digital tools in reducing social isolation and addressing support needs among informal caregivers: A scoping review. *BMC Public Health*, 19(1), 1495. <https://doi.org/10.1186/s12889-019-7837-3>
- Norman, C. D., & Skinner, H. A. (2006). eHEALS: The eHealth literacy scale. *Journal of Medical Internet Research*, 8(4), e27. <https://doi.org/10.2196/jmir.8.4.e27>
- OECD (2021). The role of online platforms in weathering COVID-19 shock. <https://www.oecd.org/coronavirus/policy-responses/the-role-of-online-platforms-in-weathering-the-covid-19-shock-2a3b8434>
- Park, S., Kim, B., & Kim, K. A. (2021). Preventive behavioral insights for emerging adults: A survey during COVID-19 pandemic. *International Journal of Environmental Research & Public Health*, 18(5), 2569. <https://doi.org/10.3390/ijerph18052569>
- Park, E. S., Oh, H. J., Kim, S. H., & Min, A. (2018). The relationships between particulate matter risk perception, knowledge, and health promoting behaviors among college students. *Journal of Korean Biological Nursing Science*, 20(1), 20–29. <https://doi.org/10.7586/jkbns.2018.20.1.20>
- Patil, U., Kostareva, U., Hadley, M., Manganello, J. A., Okan, O., Dadaczynski, K., Massey, P. M., Agner, J., & Sentell, T. (2021). Health literacy, digital health literacy, and COVID-19 pandemic attitudes and behaviors in U.S. college students: Implications for interventions. *International Journal of Environmental Research & Public Health*, 18(6), 3301. <https://doi.org/10.3390/ijerph18063301>
- Rieger, M. O. (2020). What makes young people think positively about social distancing during the Corona crisis in Germany? *Frontiers in Sociology*, 5, 61. <https://doi.org/10.3389/fsoc.2020.00061>
- Sánchez-Arenas, R., Doubova, S. V., González-Pérez, M. A., & Pérez-Cuevas, R. (2021). Factors associated with COVID-19 preventive health behaviors among the general public in Mexico City and the state of Mexico. *PLoS One*, 16(7), e0254435. <https://doi.org/10.1371/journal.pone.0254435>
- Sharma, S., Oli, N., & Thapa, B. (2019). Electronic health-literacy skills among nursing students. *Advances in Medical Education and Practice*, 10, 527–532. <https://doi.org/10.2147/AMEP.S207353>
- Smail, E., Schneider, K. E., DeLong, S. M., Willis, K., Arrington-Sanders, R., Yang, C., Alexander, K., & Johnson, R. M. (2021). Health beliefs and preventive behaviors among adults during the early COVID-19 pandemic in the United States: A latent class analysis. *Prevention Science*, 22(8), 1013–1022. <https://doi.org/10.1007/s11121-021-01273-0>
- Song, H., Omori, K., Kim, J., Tenzek, K. E., Hawkins, J. M., Lin, W. Y., Kim, Y. C., & Jung, J. Y. (2016). Trusting social media as a source of health information: Online surveys comparing the United States, Korea, and Hong Kong. *Journal of Medical Internet Research*, 18(3), e25. <https://doi.org/10.2196/jmir.4193>
- Teyhen, D. S., Robbins, D., & Ryan, B. A. (2018). Promoting and sustaining positive personal health behaviors: Putting the person first. *Military Medicine*, 183(suppl_3), 213–219. <https://doi.org/10.1093/milmed/usy212>
- Walker, S. N., Sechrist, K. R., & Pender, N. J. (1995). Health promotion model-instruments to measure health promoting lifestyle: Health-promoting lifestyle profile [HPLP II] (adult version). Retrieved from https://deepblue.lib.umich.edu/bitstream/handle/2027.42/85349/HPLP_II-background_and_permission.pdf?sequence=1&isallowed=y

How to cite this article: Kim, K-A, Hyun, M. S., De Gagne, J. C., & Ahn, J-A (2023). A cross-sectional study of nursing students' eHealth literacy and COVID-19 preventive behaviours. *Nursing Open*, 10, 544–551. <https://doi.org/10.1002/nop2.1320>