









# Association between Online Learning Predictors and Psychological Distress among Nursing Students during the COVID-19 Pandemic

Akbar Satria Fitriawan<sup>1</sup> , Bayu Fandhi Achmad<sup>2</sup> , Dedi Kurniawan<sup>3</sup> , Raisa Farida Kafil<sup>4</sup> , Listyana Natalia<sup>5</sup> , Wiwit Ananda Wahyu Setyaningsih<sup>6\*</sup> 

<sup>1</sup>Department of Nursing, Faculty of Health Sciences, Universitas Respati Yogyakarta, Yogyakarta, Indonesia; <sup>2</sup>Department of Basic and Emergency Nursing, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia; <sup>3</sup>Department of Nursing, Kepanjen School of Health Sciences, Malang, Indonesia; <sup>4</sup>Department of Anaesthesiology Nursing, Faculty of Health Sciences, Universitas Aisyiyah Yogyakarta, Yogyakarta, Indonesia; <sup>5</sup>Department of Nursing Management, Faculty of Health Sciences, Universitas Respati Yogyakarta, Indonesia; <sup>6</sup>Department of Anatomy, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia

## Abstract

**BACKGROUND:** The global coronavirus disease-2019 pandemic has forced nursing schools in Indonesia to implement online learning. The association between online learning variables and psychological distress among nursing students is not fully understood.

**AIM:** This study aimed to assess psychological distress among nursing students and the association between online learning variables and psychological distress.

**MATERIALS AND METHODS:** A cross-sectional study was conducted from November 2020 to February 2021. Six hundred and thirty-five nursing students from four universities in Indonesia participated in this study and were recruited through a consecutive sampling method. The measurement of psychological distress used the 10-item Kessler Psychological Distress Scale. Ordinal logistic regression was used to analyze the association between online learning predictors and psychological distress.

**RESULTS:** Most of the respondents had severe psychological distress ( $n = 194$ ; 30.6%). Older age was found to act as a protective factor against psychological distress (adjusted odds ratio [aOR] =  $-0.159$ ,  $p = 0.035$ ; 95% confidence interval [CI]:  $(-0.307)$ – $(-0.011)$ ). Contrarily, not living at their own home during lockdown (aOR =  $1.019$ ,  $p = 0.001$ ; 95% CI:  $0.657$ – $1.382$ ), always feeling that online learning is expensive (aOR =  $1.387$ ,  $p = 0.001$ ; 95% CI:  $0.645$ – $2.130$ ), always experienced poor Internet connection during online learning (aOR =  $3.380$ ,  $p = 0.001$ ; 95% CI:  $1.935$ – $4.826$ ), and having no motivation toward online learning (aOR =  $3.154$ ,  $p = 0.001$ ; 95% CI:  $2.372$ – $3.936$ ) acted as risk factors for having psychological distress.

**CONCLUSION:** Cost and Internet access barriers as well as low motivation during the abrupt shift to implementation of online learning in the current pandemic situation acted as risk factors for psychological distress among nursing students.

**Edited by:** Igor Spiroski  
**Citation:** Fitriawan AS, Achmad BF, Kurniawan D, Kafil RF, Natalia L, Setyaningsih WAW. Association between Online Learning Predictors and Psychological Distress among Nursing Students during the COVID-19 Pandemic. Open Access Maced J Med Sci. 2022 Apr 14; 10(E):805-812. https://doi.org/10.3889/oamjms.2022.9215  
**Keywords:** COVID-19; Psychological distress; Nursing students; Online learning; Kessler psychological distress scale  
**\*Correspondence:** Wiwit Ananda Wahyu Setyaningsih, Department of Anatomy, Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada, Indonesia. E-mail: wiwit.ananda.w@ugm.ac.id  
**Received:** 06-Mar-2022  
**Revised:** 28-Mar-2022  
**Accepted:** 04-Apr-2022  
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**Funding:** This research did not receive any financial support  
**Competing Interests:** The authors have declared that no competing interests exist  
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## Introduction

In December 2019, the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) was discovered as a novel enveloped positive single-strand RNA virus that was causing severe pneumonia cases in Wuhan, China [1], [2], [3], [4]. SARS-CoV-2 is a highly contagious virus with multiple routes of transmission, and its infection in human causes the coronavirus disease-2019 (COVID-19), which has a broad spectrum of clinical manifestations ranging from asymptomatic to fatal condition. Spreading rapidly to more than 200 countries and causing high mortality, COVID-19 was declared a global pandemic on March 11, 2020 [5], [6].

Due to the unavailability of effective treatment and vaccines in the early stage of the pandemic, social distancing and lockdown were considered effective strategies to halt the SARS-CoV-2 transmission [7]. Social distancing and lockdown policies have been employed in Indonesia, which resulted in university closures [8]. The distance education has been implemented since March 24, 2020, in Indonesia and forced educational sectors, including nursing institutions, to shift into fully online learning. In this pandemic situation, online learning is considered the most important strategy for the implementation of nursing education. Online learning enables teachers and students to participate in the teaching and learning process from anywhere without the constraints of time and space [9] as well as to prevent SARS-CoV-2 transmission in the education sector.

Despite the advantages of online learning, its implementation still faces obstacles and challenges that may hinder the success of its programs [10]. Online learning was identified as the most serious issue among university students during the COVID-19 pandemic [11]. In developing countries, students are facing numerous difficulties during the abrupt shift to the implementation of online learning in this pandemic crisis such as cost and Internet access issues [12], time management issues [13], motivation issues, and technical issues [10]. During distance learning, students are often unable to receive adequate support from peers and teachers, and they often cannot get adequate assistance when facing troublesome difficulties during teaching and learning process. They are left to solve these barriers and to motivate themselves [14]. Lockdown policies have caused the students to stay at their homes for long periods of time, placing them into long-term isolation [15]. The sudden switch to online learning during the current pandemic crisis also fundamentally changed the students' everyday lives [16]. Long-term isolation at home combined with online learning could affect students' psychological well-being [11].

A previous study revealed that nursing students are facing various barriers in online learning during the COVID-19 pandemic. Highly competitive training, high academic pressure, financial difficulties, and poor quality of sleep were observed in nursing students even before the pandemic [17]. When combined with online learning implementation in the pandemic situation, it makes them becoming more psychologically vulnerable. The association between online learning variables and psychological distress among nursing students during the COVID-19 pandemic is not fully understood. Poor mental health among students had several negative impact such as lower attendance in class, lower academic achievement, reducing the likelihood of completing university [18], and higher rates of substance and alcohol abuse [19]. In order to address this gap in the literature, our present study aimed to assess the levels of psychological distress among nursing students during the COVID-19 pandemic, assess the association between sociodemographic characteristics and psychological distress, and assess the association between online learning variables and psychological distress.

## Materials and Methods

### Study design

An observational study with a cross-sectional design was conducted to identify online learning predictors that are associated with psychological distress among nursing students.

### Study setting and period

We conducted this study in four universities that provide undergraduate nursing education programs in the Special Region of Yogyakarta and East Java Province, Indonesia. Data collection was conducted from November 2020 to February 2021.

### Sample size calculation and sampling method

This research used Slovin's formula stated as  $n = N / (1 + N(e)^2)$  to determine the sample size required in which  $n$  = sample size,  $N$  = population size, and  $e$  = margin of error [20], [21]. Based on the academic data of 2020, the total number of active undergraduate nursing students in those four universities was 1547. In this study, we used a margin of error 5%. Thus, with  $n = 1547$ , and  $e = 0.05$ , the minimum sample size required in this study was 318 students. A total of 635 nursing students participated in this study who were recruited using a consecutive sampling strategy. The eligibility criteria for this study were nursing students who have been experienced in online learning for at least 1 month during the COVID-19 pandemic.

### Data collection

We created the online questionnaire using Google Forms. The questionnaire was then distributed to the participants via WhatsApp. Before the study, all the participants were phoned to explain the study information and to ask their willingness to participate. Afterward, they completed an informed consent statement from a Google Forms link as a prerequisite for further participation, and they were instructed to fill the form completely.

### Ethical approval

Ethical clearance with the number KE/FK/1067/EC/2020 was obtained from Institutional Review Board, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Indonesia.

### Instrument

The online questionnaire used in this study was divided into four sections: (1) sociodemographic characteristics, (2) information related to online learning implementation during the COVID-19 pandemic, (3) barriers to online learning, and (4) psychological distress. The first section was a sociodemographic characteristics questionnaire which was adapted from the previous study [10], [22] and consisted of seven questions about gender, age, place residing during COVID-19 lockdown, residential area during the COVID-19 lockdown, monthly family

income, type of academic institution, and academic level.

The second section consisted of six questions to assess information related to online learning implementation which was adapted from a previous study [10], [22]. The first question asks about the frequency of online classes per week. The second question asks about the type of gadget they used for attending online classes. The third question asks about the Internet connection source used for online classes. The fourth question asks about students' perception of their Internet connection quality during their online classes. The fifth question asks about the gadget ownership status. The last question asks about the history of online learning before the COVID-19 pandemic.

The third section included five questions to assess barriers to online learning (expensive cost, poor Internet connection, lack of technical assistance, learning interruption, and low learning motivation) that were adapted from a previous study [23]. The first question asked, "In the past 30 days, how often do you feel that the cost to access online learning is expensive?" The second question asked, "In the past 30 days, how often do you have a poor Internet connection to access online learning?" The third question asked, "In the past 30 days, how often do you feel that you are not received adequate assistance from academic staff when facing difficulties during online learning?" The fourth question asked, "In the past 30 days, how often do you get interruptions from family members or friends during online learning?" These questions have a response choice as follows: Never, sometimes, often, and always. In the fifth question, the students were asked to rate their motivation for online learning that was adapted from a previous study [11]. Motivation for online learning was measured by asking the participants, "What is your current level of motivation to attend online learning?", and have response choice as follows: no motivation, low motivation, moderate motivation, and strong motivation.

In the fourth section, the Indonesian version of the 10-item Kessler Psychological Distress Scale (K10) was used to assess psychological distress. The K10 has Cronbach's  $\alpha = 0.89$ , suggesting high-internal reliability [24]. It consisted of 10-item questions, and each item was measured on a 5-point Likert scale as follows: None of the time (1 point), a little of the time (2 points), some of the time (3 points), most of the time (4 points), and all of the time (5 points) [11], [25], [26]. Thus, the minimum and maximum scores were 10 and 50, respectively [11]. If questions number 2 and number 5 were answered as "None of the time", then questions number 3 and number 6 were automatically regarded as "None of the time" and scored as one point [11]. The questions of the K10 are as follows:

- Question 1: "During the last 30 days, how often did you feel tired out for no good reason?"

- Question 2: "During the last 30 days, how often did you feel nervous?"
- Question 3: "During the last 30 days, how often did you feel so nervous that nothing could calm you down?"
- Question 4: "During the last 30 days, how often did you feel hopeless?"
- Question 5: "During the last 30 days, how often did you feel restless or fidgety?"
- Question 6: "During the last 30 days, how often did you feel so restless you could not sit still?"
- Question 7: "During the last 30 days, how often did you feel depressed?"
- Question 8: "During the last 30 days, how often did you feel that everything was an effort?"
- Question 9: "During the last 30 days, how often did you feel so sad that nothing could cheer you up?"
- Question 10: "During the last 30 days, how often did you feel worthless?"

The K10 total score then categorized into four groups of psychological distress severity: 10–19 = no psychological distress, 20–24 = mild psychological distress, 25–29 = moderate psychological distress, and 30–50 = severe psychological distress [11], [25].

### Statistical analysis

Statistical analyses were performed using the SPSS v.23 (IBM Corp, Armonk, NY). Descriptive analysis used in this study was mean and standard deviation (SD) for numerical variables, while frequency and percentage were used for categorical variables. Ordinal logistic regression analysis was performed to assess the association between independent sociodemographic and online learning predictors and psychological distress severity. The confidence level was set at 95% and  $p < 0.05$  was considered statistically significant. The ordinal logistic regression results were presented in tables with an adjusted odds ratio (aOR) and the corresponding 95% confidence interval [CI].

## Results

### Respondents' characteristics

A total of 635 undergraduate nursing students participated in this study. The mean age was 19.9 years (SD = 1.28) and ranged between 17 and 24 years. Most of the participants were female ( $n = 512$ ; 80.6%), studying at a private university ( $n = 469$ ; 73.9%), third-year students ( $n = 219$ ; 34.5%), residing at their own home during the implementation of lockdown policy ( $n = 507$ ; 79.8%), and resided in rural area ( $n = 348$ , 54.8%). Most of the respondents had a monthly family income between IDR

1–2 million ( $n = 193$ ; 30.4%). The detailed information about the sociodemographic characteristics of the study participants is provided in Table 1.

**Table 1: Sociodemographic characteristics of the study participants (n = 635)**

Characteristics	Frequency, n (%)
Age of the student (years)*	19.9 (1.28)
Sex	
Female	512 (80.6)
Male	123 (19.4)
Place residing during the lockdown	
At own home	507 (79.8)
Other places (i.e., relative house, dormitory, rented house, etc.)	128 (20.2)
Residential area	
Rural	348 (54.8)
Urban	287 (45.2)
Monthly income of the family (IDR)	
Under 1 million	98 (15.4)
1 million–2 millions	193 (30.4)
2 millions–3 millions	111 (17.5)
3 millions–4 millions	75 (11.8)
4 millions–5 millions	66 (10.4)
Above 5 millions	92 (14.5)
Institution	
Public University	166 (26.1)
Private University	469 (73.9)
Academic level	
First year	167 (26.3)
Second year	162 (25.5)
Third year	219 (34.5)
Fourth year	87 (13.7)

\*Mean (SD). SD: Standard deviation.

### Information related to online learning

The detailed information about online learning is provided in Table 2. Most of the students attended

**Table 2: Information about online classes (n = 635)**

Variables	Frequency, n (%)
Online classes attended per week	
Above 3 days per week	550 (86.6)
3 days per week or less	85 (13.4)
Gadgets for attending online classes	
Smartphone/android mobile	255 (40.1)
Laptop/computer	97 (15.3)
Both of them	283 (44.6)
Primary internet connection source	
LAN	6 (1.0)
Mobile hotspot	456 (71.8)
Wifi	173 (27.2)
Internet connection quality	
Poor	148 (23.3)
Moderate	382 (60.2)
Good	105 (16.5)
Possess of gadgets for online classes	
Own	605 (95.3)
Hired from family members/neighbor	30 (4.7)
Attended online classes before the outbreak of COVID-19	
Yes	171 (26.9)
No	464 (73.1)
Online learning cost too much	
Never	37 (5.8)
Sometimes	138 (21.7)
Often	178 (28.0)
Always	282 (44.4)
Poor internet connection during online learning	
Never	18 (2.8)
Sometimes	171 (26.9)
Often	412 (64.9)
Always	34 (5.4)
Lack of technical assistance during online learning	
Never	111 (17.5)
Sometimes	175 (27.6)
Often	250 (39.4)
Always	99 (15.6)
Interruption during online learning	
Never	101 (15.9)
Sometimes	166 (26.1)
Often	256 (40.3)
Always	112 (17.6)
Motivation for online learning	
No motivation	75 (11.8)
Low motivation	156 (24.6)
Moderate motivation	338 (53.2)
Strong motivation	66 (10.4)

online learning more than 3 days per weeks ( $n = 550$ ; 86.6%), utilized both a Smartphone and laptop/personal computer for attending online classes ( $n = 283$ , 44.6%), using their own gadget for attending online class ( $n = 605$ ; 95.3%), and utilized a Smartphone for Internet connection ( $n = 456$ ; 71.8%). Most of the students perceived their Internet connection quality during online learning as moderate ( $n = 382$ ; 60.2%). Before the pandemic, the majority of the students had never attended online learning ( $n = 464$ ; 73.1%). Our study demonstrated that most of the students always feel that they expend a significant amount of money to obtain quota for Internet access ( $n = 282$ ; 44.4%), often had poor Internet connection during online learning ( $n = 412$ ; 64.9%), often unable to receive adequate technical assistance when they faced troublesome challenges during online learning ( $n = 250$ ; 39.4%), and often got interruptions from other persons (family, friends, etc.) during the online learning ( $n = 256$ ; 40.3%). Majority of the students reported that they had moderate motivation toward online learning ( $n = 338$ ; 53.2%).

### Severity of psychological distress among undergraduate nursing students

Remarkably, the vast majority (71.6%) of nursing students had psychological distress, with the majority of the respondents regarded as having severe psychological distress ( $n = 194$ ; 30.6%). Table 3 shows the detailed information about psychological distress severity among nursing students.

**Table 3: The severity of psychological distress among participants based on K-10 distress scale**

Severity of psychological distress	Total K-10 score range	Frequency, n (%)
No distress	10-19	181 (28.5)
Mild distress	20-24	144 (22.7)
Moderate distress	25-29	116 (18.3)
Severe distress	30-50	194 (30.6)

### Ordinal logistic regression analysis between sociodemographic and online learning predictors and psychological distress

We employed ordinal logistic regression to analyze the association between sociodemographic and online learning predictors and psychological distress. All independent variables with results  $p < 0.25$  in univariable regression were included in the final ordinal logistic regression model [11]. The detailed information about the ordinal logistic regression is provided in Table 4.

The ordinal logistic regression model demonstrated that older age acted as a protective factor against psychological distress among the students ( $aOR = -0.159$ ,  $p = 0.035$ ; 95% CI:  $(-0.307)$ – $(-0.011)$ ). Contrarily, not living at their own home during lockdown ( $aOR = 1.019$ ,  $p = 0.001$ ; 95% CI:  $0.657$ – $1.382$ ), always feeling that online learning is expensive ( $aOR = 1.387$ ,  $p = 0.001$ ; 95% CI:  $0.645$ – $2.130$ ), always experienced

**Table 4: Results of ordinal logistic regression for the association between independent predictors and psychological distress**

Predictors	Crude OR (95% CI)	p	Adjusted OR (95% CI)	p
Age	-0.101 (-0.210–0.008)	0.068	-0.159 (-0.307–0.011)	0.035
Monthly family income (million IDR)				
<1	0.622 (0.107–1.136)	0.018	0.259 (-0.316–0.835)	0.377
1–2	0.490 (0.042–0.938)	0.032	0.216 (-0.285–0.718)	0.398
2–3	0.157 (-0.340–0.654)	0.536	-0.005 (-0.553–0.542)	0.985
3–4	-0.009 (-0.558–0.540)	0.974	-0.020 (-0.624–0.583)	0.947
4–5	-0.002 (-0.571–0.567)	0.994	0.241 (-0.389–0.872)	0.453
>5	Reference		Reference	
Academic level				
First year	0.485 (0.016–0.955)	0.043	0.114 (-0.502–0.731)	0.716
Second year	0.806 (0.332–1.280)	0.001	0.402 (-0.168–0.971)	0.167
Third year	0.577 (0.126–1.028)	0.012	0.380 (-0.127–0.886)	0.142
Fourth year	Reference		Reference	
Place residing during the lockdown				
At own home	Reference		Reference	
Other place	0.822 (0.426–1.218)	0.001	1.019 (0.657–1.382)	0.001
Possess of gadgets for online classes				
Own	Reference		Reference	
Hired from family members/neighbor	0.506 (-0.161–1.173)	0.137	0.504 (-0.223–1.231)	0.174
Online learning cost too much				
Never	Reference		Reference	
Sometimes	0.546 (-0.149–1.241)	0.123	0.518 (-0.245–1.282)	0.183
Often	1.139 (0.459–1.819)	0.001	0.886 (0.134–1.639)	0.021
Always	1.857 (1.190–2.524)	0.001	1.387 (0.645–2.130)	0.001
Poor internet connection				
Never	Reference		Reference	
Sometimes	1.656 (0.590–2.721)	0.002	1.811 (0.634–2.987)	0.003
Often	2.032 (0.985–3.078)	0.001	1.876 (0.724–3.028)	0.001
Always	4.067 (2.757–5.376)	0.001	3.380 (1.935–4.826)	0.001
Lack of technical assistance				
Never	Reference		Reference	
Sometimes	0.402 (-0.027–0.830)	0.066	0.184 (-0.287–0.655)	0.444
Often	0.269 (-0.134–0.671)	0.191	-0.031 (-0.477–0.415)	0.891
Always	0.371 (-0.116–0.859)	0.136	0.109 (-0.429–0.646)	0.692
Motivation for online learning				
No motivation	3.591 (2.868–4.313)	0.001	3.154 (2.372–3.936)	0.001
Low motivation	2.131 (1.556–2.706)	0.001	1.879 (1.259–2.499)	0.001
Moderate motivation	1.264 (0.737–1.790)	0.001	1.228 (0.655–1.800)	0.001
Strong motivation	Reference		Reference	

OR: Odds ratio, CI: Confidence interval, IDR: Indonesian Rupiah

poor Internet connection during online learning (aOR = 3.380,  $p = 0.001$ ; 95% CI: 1.935–4.826), and having no motivation toward online learning (aOR = 3.154,  $p = 0.001$ ; 95% CI: 2.372–3.936) acted as risk factors for having psychological distress among the students.

## Discussion

Our study showed that the vast majority of the undergraduate nursing students (71.6%) had psychological distress, with most of the participants (30.6%) having severe psychological distress. Our study provided current evidence that the COVID-19 pandemic has contributed to psychological distress among Indonesian nursing students. Numerous studies suggested that mental health issues are commonly faced by the general population and students during COVID-19 pandemic. A previous study conducted in Jordan found that 69.5% of university students had severe psychological distress [11]. Another study revealed that COVID-19 pandemic has impacted anxiety and depression among medical students [27]. Psychological distress is an emotional state that occurs when a person experiences stressors and results in harm either temporary or permanent [28]. Lockdown policy has caused the students to stay at their homes for a long period, placing them into long-term isolation [15]. The sudden switch to online learning

during the current pandemic crisis also fundamentally changed the students' everyday lives [16]. Highly competitive training, high academic pressure, financial difficulties, and poor quality of sleep were observed in nursing students even before the pandemic. When combined with long-term isolation and online learning implementation in a pandemic situation, it makes them become more psychologically vulnerable. They face the same problems as other young non-medical students. Moreover, as a health-care student, they also have to cope with the high academic burden [17].

Among sociodemographic variables, residence during lockdown and age were associated with psychological distress. In this study, we found that students who were not living at their own home during lockdown had a higher psychological distress compared to students that are living at their own homes. Students who were not living at their own homes during COVID-19 lockdown will have less direct interaction to family and receive less social support [29]. They are also facing financial, food, and health difficulties [22]. In this condition, they had a higher level of social isolation and were more vulnerable to mental health problems [29]. A number of studies provided evidence that family support protected individuals from psychological problems [30], [31]. Family support may buffer individuals from the negative effects of various stressful life events [32], [33], [34] and recently during the COVID-19 pandemic [35]. In our study, age was inversely associated with psychological distress, suggesting that younger age groups were more likely to

have higher psychological distress severity. A previous study showed that older age acts as a protective factor against psychological distress [11] and anxiety [36].

Among online learning variables, high cost for online learning, poor Internet connection, and low motivation toward online learning were identified as predictors for psychological distress among students. Feeling that online learning is expensive was significantly associated with psychological distress among nursing students in this pandemic situation. A previous study identified that the extra financial burden for the Internet access quota is a significant barrier during online learning [10], [13]. In this study, most of the students (30.4%, Table 1) have a monthly family income of IDR 1–2 million, suggesting that most of the students come from poor economic status. A previous study demonstrated that university students with greater financial problems had higher anxiety, depression, and stress level. They also had lower global mental health and had alcohol dependence [37]. The students who had financial problem that could potentially interrupting their studies had higher depression level and poorer mental health compared to those who had no financial problems [38], and their depression worsened over time [37].

Poor Internet connection during online learning was significantly associated with psychological distress among nursing students in this pandemic situation. In developing countries, Internet access inequality was identified as a significant barrier during online learning [10], [12], [13]. Difficulties to access their online learning platform due to poor Internet connection could interrupt the online learning process and potentially result in missing their class. A previous study found that fear of failure in online classes and fear of academic loss are associated with student's psychological distress [39]. Due to Internet access inequality, some students can attend online classes in real-time, but some of them could not attend online classes in real time. Students with poor Internet access cannot receive instructions properly. Thus, this online learning barrier could increase the students' psychological distress [39].

Our study demonstrated that low motivation toward online learning was significantly associated with psychological distress. Motivation is a process of initiating and sustaining goal-directed activities [40]. Motivation is cited as a factor that plays a critical role in higher education and considered an internal force that leads to better students' academic performance and success [41]. Numerous studies demonstrated that motivation is associated with various outcomes among university students such as performance and productivity, coping mechanism, enjoyment, adaptation to university, and mental health [41], [42], [43], [44], [45]. Recently, Al-Tammemi and Akour found that low online learning motivation acted as a predictor of psychological distress [11]. A previous study identified that low online learning motivation identified as an important barrier during the implementation of online learning in the midst of

COVID-19 pandemic [10], [11]. A low sense of academic control among students due to the sudden switch from traditional into online learning during the COVID-19 pandemic could lead to low motivation and psychological well-being [46]. Considering the effect of low motivation on student psychological well-being, it is suggested that nursing educator developed teaching strategies that could enhance students' motivation toward online learning.

This study has several limitations that should be considered. First, this study used cross-sectional design therefore cannot determined causal relationship. Second, this study used an online questionnaire due to the large-scale social restriction. Third, this study did not use a standardized and validated instrument to assess online learning motivation. Besides that, we also did not assess whether intrinsic motivation or extrinsic motivation that associated with psychological distress.

Further research that addresses this limitation was needed.

## Conclusions

Our study provides substantial evidence that psychological distress is being observed among nursing students in Indonesia during the COVID-19 pandemic. Older age was found to act as a protective factor against psychological distress among the students. Contrarily, not living at their own home during lockdown, high cost to access the Internet for online learning, poor Internet connections during online learning, and low motivation toward online learning act as risk factors for having psychological distress among the students. Development of strategies that address the cost and Internet barriers in online learning implementation and strategies to improve online learning motivation is urgently needed to ameliorate the students' psychological distress.

## Acknowledgment

The authors would like to thank Mr. Erik Christopher Hookom for helping in the language editing assistance.

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