



## Original Research Paper

# The effect of laughter therapy on nursing students' anxiety, satisfaction with life, and psychological well-being during the COVID-19 pandemic: Randomized controlled study

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## ABSTRACT

**Background:** Changes in routine due to the pandemic have increased nursing students' anxiety about clinical learning. The inadequacy experienced before graduation caused them to experience high levels of anxiety characterized by feelings of insecurity and unhappiness and negatively affected their life satisfaction. Methodological studies are needed to confirm the efficacy of laughter therapy, which is effective in reducing anxiety and stress, on the online platform. The current study protocol was designed to evaluate the effect of online laughter therapy on anxiety, life satisfaction, and psychological well-being.

**Methods:** Forty students were selected for the intervention group and forty students for the control group by assigning 1:1 with a real random number selector among 140 senior nursing students who made up the universe. The intervention group received ten sessions of online laughter therapy two days a week for five weeks. Participants in the control group did not receive any intervention during the study. Data were obtained at the beginning of the study and after five weeks with the 'State-Trait Anxiety Inventory', 'Satisfaction with Life Scale' and 'Psychological Well-Being Scale'.

**Results:** After laughter therapy, the intervention result showed a significant increase in life satisfaction and psychological well-being scores ( $p < 0.001$ ) and a significant decrease in anxiety scores ( $p < 0.001$ ) in the intervention group compared to the control group.

**Conclusion:** The study reveals that online laughter therapy significantly positively affects nursing students' anxiety, life satisfaction, and psychological well-being.

## 1. Introduction

Along with routine changes such as quarantine measures implemented due to the pandemic, the integration of technology into the curriculum more than ever before has increased students' anxiety about learning [1]. The studies conducted stated that it is not sufficient to teach clinical field courses by distance education to senior nursing students who only take practice courses throughout the year [2,3]. It has been determined that students experience anxiety that they will not have the necessary professional equipment and competence when they graduate [2,3]. In this process, it has been observed that the feelings of uncertainty, insecurity, and unhappiness caused by distance education

and the COVID-19 pandemic lead to high levels of anxiety and stress in students [4–7]. Studies have shown that high anxiety levels affect students' adaptation to daily life and life satisfaction [8,9], which has a negative effect. In recent years, non-pharmacological techniques have been widely used to reduce anxiety and stress [10,11]. Laughter therapy is one of the methods used to reduce anxiety and stress levels [11,12]. In 1995, Laughter therapy, introduced by Kataria, is a technique that combines free laughter with yoga breathing [13]. Laughter therapy increases respiratory capacity by promoting deep breathing [14]. It changes the mood by combining childlike playfulness with laughter exercises. This technique affects the brain and autonomic nervous system, causing physiological changes. Laughter therapy acts on a complex

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mechanism transmitted from the hypothalamus that stimulates different cortical areas [15]. Laughter therapy effectively relaxes the muscles, makes you feel many emotions simultaneously, transforms negative emotions into positive ones, and significantly reduces depression and anxiety [16,17]. Studies have shown that laughter therapy effectively reduces the anxiety and stress levels of nursing students, improves sleep disorders, improves social functions, reduces work stress, and improves subjective well-being levels [18–21]. Studies have shown that it increases psychological well-being in adults [22] and enhances life satisfaction and loneliness levels by improving mood in adults [23].

Studies revealed that internet-based interventions could be beneficial in evaluating people’s psychosocial status, applying non-pharmacological techniques to people with psychological problems, and reducing anxiety and stress during the pandemic period [24–26]. During the pandemic process, non-pharmacological techniques have been used to reduce the anxiety levels of individuals by using online platforms, online aerobic activities, balance and flexibility exercises, and relaxation techniques [25,27]. In this process, individuals were reached worldwide through online platforms, online aerobic activities, balance and flexibility exercises, and non-pharmacological techniques were started to be used [25,27]. Although it was stated that these methods were effective in reducing anxiety levels, the lack of group interactive intervention in these studies led to the preference for laughter therapy. Laughter therapy is a technique that begins as a physical exercise and provides interaction based on establishing eye contact with other participants in the group [35]. During this period of

quarantine and isolation [24], group-oriented laughter therapy will increase the feeling of togetherness and happiness [14] and positively contribute to students’ life satisfaction and psychological well-being. In addition, studies have shown that laughter therapy effectively reduces anxiety and stress [12,17,20]. However, since no studies have been found in the literature on online laughter therapy, methodological studies are needed to confirm the effectiveness of the therapy on its applicability on the online platform. Therefore, the current study protocol was designed to evaluate the effect of online laughter therapy on anxiety, life satisfaction, and psychological well-being.

The hypotheses of this study are:

- H<sup>1</sup> Laughter therapy increases life satisfaction during the COVID-19 pandemic process.
- H<sup>2</sup> Laughter therapy increases psychological well-being during the COVID-19 pandemic process.
- H<sup>3</sup> Laughter therapy reduces anxiety during the COVID-19 pandemic process.

## 2. Methods

### 2.1. Design

This study was conducted as a randomized controlled study with the pretest-posttest control between November 2020 and March 2021 in the Nursing Department of the Faculty of Health Sciences of a university in

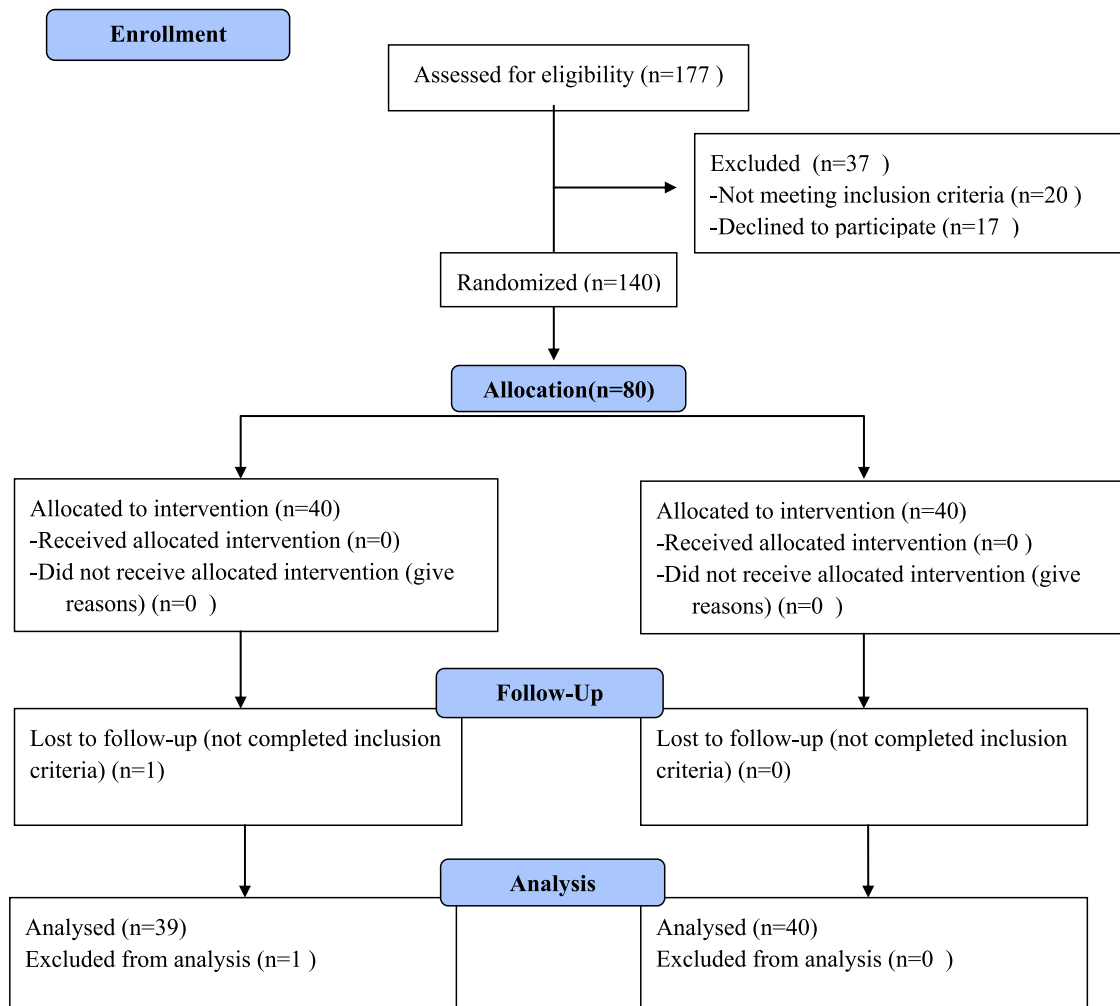


Fig. 1. CONSORT Flow diagram.

Turkey's western Black Sea region.

## 2.2. Participants

The research population consists of 177 senior nursing students studying at the Faculty of Health Sciences, Department of Nursing. Twenty students were excluded from the study because they did not meet the inclusion criteria, and 17 did not want to participate, leaving a potential pool of 140 nursing students (Fig. 1). Power analysis was performed to determine the appropriate sample size. The sample size was defined as 80 nursing students, with 40 students in each group with an effect size of 0.5 and power of 0.80 [28].

### 2.2.1. Randomization and blinding

All participants were blind to the therapy program, and the laughter therapist was blind to participant distribution. One hundred forty nursing students were numbered from 1 to 140 according to the class list by a co-investigator blinded to the study. In order to eliminate the possibility of bias in a group assignment, participants' real random number selector (<https://www.random.org/>) was used; 40 students were selected for the intervention group and 40 students for the control group by 1:1 distribution. In the study, the researcher collected pre-test and post-test data who did not apply the therapy. The data coded according to the groups was transferred to SPSS and analyzed by a statistician blinded to the study. A total of 79 participants completed the study (intervention group  $n = 39$  and control group  $n = 40$ ) (Fig. 1).

### 2.2.2. Inclusion and exclusion criteria

The inclusion criteria are as follows: Having an internet package, being able to use the internet actively, having the ability to download the ZOOM program on telephone or computer, and the ability to join the application. In addition, participants were excluded in the study if they met any of the specified criteria: (a) Under conditions that are not recommended to do laughter therapy (having surgery in the abdominal area in the last three months, uncontrollable hypertension, chronic cough, incontinence, acute mental disorders, consumption of antipsychotic drugs, glaucoma, hernia, Epilepsy), (b) simultaneously participating in other complementary treatment methods, (c) unwillingness to continue participating in the study.

## 2.3. Data collection instruments

The data of the study were collected using the "Personal Information Form" consisting of 12 questions including demographic characteristics of students (gender, age, income status), "State-Trait Anxiety Inventory," "Satisfaction with Life Scale," and "Psychological Well-Being Scale."

### 2.3.1. Personal Information Form

The personal information form prepared by the researcher consists of 12 questions that will determine the demographic characteristics of the students (age, education, income level), whether they have any health problems, are Negatively affected by distance education in a clinical course/ theoretical course and fear of "late graduation" due to the pandemic process.

### 2.3.2. State-Trait Anxiety Inventory (STAI)

State-Trait Anxiety Inventory (STAI) was developed by Spielberger et al. in 1970. It was adapted to Turkish society in 1985 by Öner and Le Compte. The STAI is a scale that separately measures state and trait anxiety levels, with 20 items scored by a Likert scale. The expressions in the scale range from "almost never" to "almost always". There are two types of expressions in the State-Trait Anxiety scales. Direct expressions express negative feelings, and inverted expressions express positive feelings. Reversed expressions in the state anxiety scale (SAS) are items 1, 2, 5, 8, 10, 11, 15, 16, 19, and 20. Reversed expressions in the trait anxiety scale (TAS) are items 21, 26, 27, 30, 33, 36, and 39. The total

score obtained from both scales varies between 20 and 80. High scores indicate a severe form of anxiety, whereas low scores indicate a mild state of anxiety [29]. In our study, the scale's Cronbach alpha internal consistency was 0.950.

### 2.3.3. The Satisfaction with Life Scale (SWLS)

The Satisfaction with Life Scale (SWLS) was developed by Diener, Emmons, Larsen, and Griffin in 1985 and was adapted into Turkish by Köker in 1991. The scale consists of five positive statements. The scale aims to measure general life satisfaction, and it is suitable for all ages, from adolescents to adults. The SWLS is a 7-point Likert-style response scale. The level of agreement with each item is scored as "1 = Strongly disagree," "2 = Disagree," "3 = Slightly disagree," "4 = Neither agree nor disagree," "5 = Slightly agree," "6 = Agree," and "7 = Strongly agree". The lowest score obtained from the scale is 5, and the highest score is 35. A low score is accepted as an indicator of low satisfaction with life. Köker was reported the Cronbach alpha internal consistency coefficient of the scale as 0.85 [30]. In our study, the Cronbach alpha internal consistency level was found to be 0.863.

### 2.3.4. Psychological Well-Being Scale (PWBS)

The psychological Well-being Scale was developed by Diener, Scollon, and Lucas, (2009) to measure psychological well-being. The scale has eight items. The internal consistency coefficient of the scale is 0.87. The adaptation study of the Psychological Well-being Scale into Turkish was conducted by Telef (2013). In the Turkish adaptation study, the internal consistency coefficient was determined as 0.87. The scale is scored between 1 and 7 points. The high score indicates that the person has psychological power [31]. In our study, the Cronbach alpha coefficient was found to be 0.861.

## 2.4. Data collection

The study data were gathered via the online survey form. Information was given to the participants ( $n:80$ ) about the study via ZOOM by the researcher. Identity information was not included in the forms filled out by the students, and a code system was created to determine the relationship between the forms completed before and after the laughter therapy. STAI and SWLS, PWBS were applied to the intervention and control group in the pretest stage. 5 weeks later, in the post-test stage, "STAI," "SWLS," "PWBS" were reapplied in the post-test stage.

## 2.5. Laughter therapy

### 2.5.1. Laughter therapy in the intervention group

The corresponding author implementing the intervention is the holder of an International Laughter Yoga Leader Certificate, the researcher herself executed the intervention.

Laughter therapy was applied to the intervention group for five weeks, two sessions a week, for ten sessions, through the ZOOM platform. In our study, the number of sessions applied in the study of Kuru Alici was taken into account. [32]. First of all, Whatsapp groups were created by the researchers for both the control and intervention groups after all the participants completed the pretest application. The control group was informed about the therapy in writing via the Whatsapp application. After giving written information about the therapy to the intervention group, The days and times of the laughter therapy sessions were decided. A reminder message about the session's start time was sent to the intervention group by the researcher who applied the laughter therapy before each session. The researchers did not share anything with the participants in the intervention group, apart from giving information about the research and reminding the intervention group of the session times. Before starting the practice, the researcher wanted the students in the intervention group to download the ZOOM program to their phones or computers. The researcher was told how the procedure would take place in the system. Since the students would be

connected live with the ZOOM program, their most convenient time intervals were determined. The sessions were planned according to the days and hours the students could participate. The sessions were organized on Saturdays and Wednesdays between 19:00 and 20:00. The researcher explained the importance of continuity in therapy and talked about the importance of their participation in each session. In addition, the researcher gave information about keeping their cameras and microphones on and making eye contact during therapy.

**2.5.1.1. Laughter therapy sessions.** Each laughter therapy session consisted of four parts; The first part consisted of hand-clapping and warm-up exercises. Participants applaud by keeping their hands parallel to each other for an average of 10 min. Then, the hands have clapped in a rhythm of 1–2, 1–2–3, and the song Ho-Ho, Ha-Ha-Ha is sung with a clap. Thus, touching the fingers and palms together stimulates the acupuncture points and increases the energy level [14]. In the second part, deep breathing exercises, take deep a breath as possible by raising the arms. After the deep inhalation, the breath is held for 4–5 s, and after the arms are brought to the normal position, the breath is exhaled slowly and rhythmically. The exhalation time should be longer than the inhalation time in any deep breathing exercise and is maintained for an average of 10 min [33]. The third part, the childlike games to elicit and trigger simulated laughter, takes an average of 10 min. There is dancing and singing between laughter and breathing exercises in this part. The fourth part is where the laughter exercises are done [14]. This section uses various scenarios to elicit unconditional laughter (for example, Zipper laughter: Participants are asked to think as if they have a zipper on their imaginary lips. On the leader’s instruction, they say Hmmm... and get serious by closing the zipper and bursting into mouthfuls of laughter when they open it. This type of exercise is repeated four times). The scenarios used in our study, mobile phone laughter, lion laughter, milkshake laughter, hot soup laughter, shoulder laughter, etc. [23] were applied. Afterwards, meditation is performed with a 5-minute relaxation exercise, and the therapy is terminated. Participants’ feedback is essential in preparing for the following sessions [14,34], so after each session, the students’ feedback on the therapy application was received.

**2.5.2. Laughter therapy in the control group**

Participants in the control group (n = 40) received no intervention. In this process, the participants continued their lessons and their routine lives. After the data collection process was completed, laugh therapy sessions were planned for the control group, per the principle of equality, in order not to deprive the interventions known to be beneficial, and it was applied to the participants who wanted to participate in the therapy. After the effectiveness of online laughter therapy was evaluated statistically, laughter therapy was applied to the students in the control group who wanted to receive laughter therapy, adhering to ethical principles, at the end of the research.

**2.6. Data analysis**

R version 2.15.3 Software was used for statistical analysis. Shapiro-Wilk test and graphical analysis were used to evaluate the distribution normality of quantitative data. Independent samples t-test was used for the evaluation of quantitative variables between groups. Paired samples t-test was employed to test the change in quantitative variables over time. Pearson’s chi-square test, Fisher’s exact test, and Fisher-Freeman-Halton exact test were employed for comparison of categorical data. Pearson’s correlation coefficient was used to determine the level of correlation between changes observed in the scales over time. Statistical significance was accepted as p < 0.05.

**2.7. Ethical considerations**

Approval was taken from the Ethics Committee of the Foundation

University. The study was registered at Clinical Trials.gov (NCT04786483). Research ethics principles established by the Declaration of Helsinki were followed throughout the study. The participating students were provided with information about the study, and their informed consent was obtained.

**3. Results**

Participants in the intervention and control groups were found similar before laughter therapy in terms of age, gender, family income, family type, place of residence, employment status, presence of health problems, having COVID-19, following the news about COVID-19, and participation in courses/training/activities. The intervention group stated that their theoretical and clinical field courses were more negatively affected by distance education (p = 0.007, p = 0.011) (Table 1). The similarity of students in terms of sociodemographic characteristics made us think that their experiences of education and other factors (such as infrastructure, internet connection, home environment) during the COVID-19 pandemic were similar. The rate of participants who stated that clinical field courses were adversely affected by distance education during the pandemic process was found to be higher in the intervention group than in the control group (p = 0.011). Table 1 shows the demographic characteristics of the groups.

**Table 1**  
Sociodemographic Characteristics of Intervention and Control Groups.

	Intervention group (n = 39)	Control group (n = 40)	p
Gender (Female) n (%)	27 (69.2)	22 (55)	<sup>a</sup> 0.193
Age (25 and above) n (%)	2 (5.1)	8 (20)	<sup>b</sup> 0.087
Family income n (%)			<sup>a</sup> 0.523
	6 (15.4)	5 (12.5)	
Income is more than expenses	28 (71.8)	26 (65)	
Income and expenses are equal	5 (12.8)	9 (22.5)	
Income is less than expenses			
Family type n (%)			<sup>c</sup> 0.778
	34 (87.2)	34 (85)	
Nuclear family	4 (10.3)	3 (7.5)	
Extended family	1 (2.6)	3 (7.5)	
Separated family			
Residence n (%)			<sup>c</sup> 0.187
	37 (94.9)	33 (82.5)	
With family	2 (5.1)	5 (12.5)	
In the student house	0 (0)	2 (5)	
Housing / apart			
Employment status n (%)	3 (7.7)	6 (15)	<sup>b</sup> 0.481
Presence of health problems	4 (10.3)	5 (12.5)	<sup>b</sup> 0.999
Having COVID-19	2 (5.1)	5 (12.5)	<sup>b</sup> 0.432
Following the news about COVID-19	39 (100)	37 (92.5)	<sup>b</sup> 0.241
Negatively affected by distance education (theoretical course) n (%)			<sup>a</sup> 0.007*
	34 (87.2)	22 (55)	
Yes	3 (7.7)	10 (25)	
No	2 (5.1)	8 (20)	
Not sure			
Negatively affected by distance education (clinical course) n (%)			<sup>c</sup> 0.011*
	35 (89.7)	28 (70)	
Yes	1 (2.6)	10 (25)	
No	3 (7.7)	2 (5)	
Not sure			
Course/training/activity/event participation n (%)	21 (53.8)	15 (37.5)	<sup>a</sup> 0.145

<sup>a</sup> Pearson chi-square test

<sup>b</sup> Fisher’s exact test

<sup>c</sup> Fisher-Freeman-Halton exact test. \*p < 0.05

3.1. Pretest and post-test PWBS, SWLS, SAS, and TAS means of students in the intervention group and control group

Table 2 shows the comparisons of the intervention and control groups in terms of participants' PWBS, SWLS, SAS, and TAS scores. After the intervention, the change in the intervention group in terms of PWBS and SWLS scores was found to be significantly greater than the control group ( $p < 0.05$ ). At the same period, the scores of the control group participants for PWBS and SWLS was not found to be statistically significant ( $p > 0.05$ ). It was determined that the change observed in the intervention group for the SAS and TAS values was significantly greater than the change observed in the control group ( $p < 0.05$ ). The change observed in the SAS scores of the control group participants was found to be statistically significant ( $p < 0.05$ ). The change observed in the TAS scores of the control group participants was found to be statistically not significant ( $p > 0.05$ ). It was found that the change observed in the intervention group was significantly greater than the change observed in the control group ( $p < 0.001$ ) (Table 2).

3.2. The correlation between anxiety, satisfaction with life, psychological well-being levels

According to Pearson's correlation analysis, a strong positive correlation was found between psychological well-being and satisfaction with life ( $r = 0.618, p < 0.001$ ) in both the intervention and control groups. A weak negative correlation at the level of 0.389 was found between PWBS and SAS ( $r = -0.389, p < 0.001$ ). A moderate negative correlation at the level of 0.419 was found between PWBS and TAS ( $r = -0.419, p < 0.001$ ). A weak negative correlation at the level of 0.386 was found between SWLS and SAS ( $r = -0.386, p < 0.001$ ). Also, a moderate negative correlation at the level of 0.413 was found between SWLS and TAS ( $r = -0.413, p < 0.001$ ) (Table 3).

4. Discussion

4.1. Satisfaction with life, psychological well-being and anxiety levels

This study aims to examine the effect of online laughter therapy on anxiety, satisfaction with life, and psychological well-being levels of senior nursing students during the pandemic process. In this study, students' levels of satisfaction with life who received laughter therapy increased significantly ( $p < 0.001$ ) (Table 2). Thus, our H<sup>1</sup> hypothesis was confirmed. There are no studies in the literature that examined the effectiveness of laughter therapy on nursing students' satisfaction with life, but the studies are heterogeneous and differ from our study in terms of intervention groups (Alzheimer's, depressed elderly, elderly individuals). In their study, Alici and Bahçeli have reported the positive effects of laughter therapy intervention applied to elders for six weeks on satisfaction with life and loneliness levels [23]. Numerous studies have demonstrated the positive effects of laughter therapy intervention on satisfaction with life in older adults [35–37]. There are many

Table 2 Comparison of Students' Measurement Mean Scores of STAI, PWBS and SWLS Scales According to the Intervention and Control Groups.

	PWBS			SWLS			SAS			TAS		
	Intervention	Control	d <sub>p</sub>	Intervention	Control	d <sub>p</sub>	Intervention	Control	d <sub>p</sub>	Intervention	Control	d <sub>p</sub>
Pretest	43.03 ± 6.79	39.13 ± 7.97	<b>0.022*</b>	20.67 ± 5.65	18.60 ± 5.91	<b>0.117</b>	46.49 ± 10.00	47.63 ± 11.94	<b>0.648</b>	46.62 ± 8.56	48 ± 8.36	<b>0.469</b>
Posttest	47.41 ± 5.29	39.08 ± 7.97	<b>&lt; 0.001*</b>	25.59 ± 3.65	19.28 ± 6.18	<b>&lt; 0.001*</b>	30.21 ± 5.73	42.90 ± 11.57	<b>&lt; 0.001*</b>	39.87 ± 6.94	46.9 ± 8.51	<b>&lt; 0.001*</b>
difference	4.38 ± 5.29	-0.05 ± 7.54	<b>0.003*</b>	4.92 ± 4.34	0.68 ± 4.25	<b>&lt; 0.001*</b>	-16.28 ± 10.68	-4.73 ± 11.05	<b>&lt; 0.001*</b>	-6.74 ± 6.16	-1.10 ± 5.61	<b>&lt; 0.001*</b>
ε <sub>p</sub>	<b>&lt; 0.001*</b>	<b>0.967</b>		<b>&lt; 0.001*</b>	<b>0.321</b>		<b>&lt; 0.001*</b>	<b>0.010*</b>		<b>&lt; 0.001*</b>	<b>0.222</b>	

Abbreviations: PWBS, Psychological Well-Being Scale; SWLS, Life Satisfaction Scale; SAI, State Anxiety Scale; TAI, Trait Anxiety Scale

<sup>d</sup>Independent samples t test. <sup>ε</sup>Paired samples t test

\* $p < 0.05$

Table 3 Pearson Correlation Analysis Between the Scales According to the Intervention and Control Groups.

	Total		Intervention		Control	
	r	p	r	p	r	p
PWBS-SWLS	0.618	< 0.001*	0.378	0.018*	0.702	< 0.001*
PWBS - SAS	-0.389	< 0.001*	-0.291	0.073	-0.283	0.077
PWBS- TAS	-0.419	< 0.001*	-0.311	0.054	-0.350	0.027*
SWLS- SAS	-0.386	< 0.001*	-0.136	0.409	-0.302	0.058
SWLS-TAS	-0.413	< 0.001*	-0.215	0.190	-0.331	0.037*
SAS- TAS	0.417	< 0.001*	0.156	0.342	0.378	0.016*

Pearson correlation analysis \* $p < 0.05$

determinants of satisfaction with life. In the meta-analysis, in which 245 studies from 32 countries were covered, it was revealed that personal self-efficacy is also important as well as mental and physical health in terms of satisfaction with life [38]. Beckman revealed that individuals who received laughter therapy increased personal productivity and self-efficacy as well as mental health [39]. In this study, considering the differences in satisfaction with life scores before and after the intervention, it was determined that the satisfaction with life scores was increased after the intervention. While the senior nursing students needed to do the clinical practices, they had to carry out this process with distance education due to the pandemic. This situation causes students to feel inadequate in terms of not being able to apply their clinical knowledge and skills when they graduate since they are senior year students. In the literature, it has been reported that nursing students' self-efficacy was adversely affected as a result of the prolongation of the distance education process during the pandemic process and the inability of nursing students to perform skill training in the context of online learning [40]. During the pandemic period, dance and yoga are forms of physical activity that can be done in any environment; When this kind of activities are performed for a minimum of at least one month, three days a week, for at least 30 min, they help in reducing stress, anxiety, depression and improving feelings of self-efficacy [41–43]. During the pandemic process, interventions such as online laughter therapy can be effectively used to increase the senior nursing students' feelings of self-efficacy that have not been able to perform their clinical applications.

This study has found that laughter therapy had a statistically significant effect on nursing students' psychological well-being ( $p < 0.05$ ) (Table 2). Thus, our H<sup>2</sup> hypothesis was confirmed. Similarly, a previous study, in which one hour of laughter therapy once a week was applied in six different regions to groups of healthy volunteers with only willingness criteria between the years of 2014 and 2015 has found that laughter therapy intervention positively affects the individuals' psychological well-being levels [44]. It has been found that laughter therapy, as an intervention to increase the psychological well-being of those who voluntarily care for families affected by HIV, positively affects the psychological well-being of caregivers [22]. Studies have revealed that

individuals with high psychological well-being have a higher life expectancy, happiness levels, and social participation; many researchers have found that positive social interactions help develop and maintain psychological well-being [45,46]. Laughter therapy encourages people to socialize; it is an effective emotional response to human life and social function. The application of this technique, which enables senior nursing students to connect, who stay away from socialization due to isolation and quarantine practices during the pandemic process, can be considered as an alternative technique for nursing students before graduation. In addition, by making them feel good with laughter therapy, it is ensured that they start their professional life with high morale.

Anxiety is a natural response and a necessary stimulation adaptation in individuals [17]. Anxiety, defined as fear, worry, and uneasiness in the presence or absence of psychological stress, can lead to physical or bodily symptoms (tachycardia, sleep disorder, etc.). In this study, the anxiety levels of the students who received laughter therapy decreased significantly ( $p < 0.05$ ). Thus, our  $H^3$  hypothesis was confirmed. Similar to the present study, it was found that applying one-hour laughter therapy once a week, four sessions per month, to the patients diagnosed with breast cancer was effective in reducing anxiety [47]. In the study in which the anxiety levels of patients treated in the oncology clinic were evaluated, after six sessions of laughter therapy, the anxiety levels of the patients in the intervention group were found to be significantly lower than the anxiety levels of the patients in the control group [48]. It has been demonstrated that laughter therapy applied to Parkinson's patients for eight weeks can reduce the anxiety levels of patients [49]. Gaining clinical knowledge and skills before graduation is very essential for students in nursing education. The pandemic has also negatively affected nursing education all over the world. This process has led to high levels of anxiety before graduation that students will graduate with insufficient knowledge and skills in clinical practice. In our study, it was observed that laughter therapy significantly reduced students' anxiety levels. The implementation of laughter therapy, which is a cost-effective and universal technique for reducing negative emotions, to senior nursing students who experience the same feelings during this period, will be effective in reducing their anxiety levels before graduation.

#### 4.2. The correlation between anxiety, satisfaction with life, psychological well-being levels

This study has found a strong positive correlation between psychological well-being and satisfaction with life in the intervention and control groups (Table 3). Similarly, studies have also reported that there is a strong positive correlation between psychological well-being and life satisfaction [47,50,51]. In our study, a moderate negative correlation was found between PWBS and SAS and between PWBS and TAS. Similarly, a negative correlation was found between SWLS and SAS, and between SWLS and TAS. It has been reported that reducing anxiety and stress levels of individuals with laughter therapy can increase individuals' satisfaction with life and psychological well-being [52]. Another study has revealed that laughter therapy is beneficial and effective in improving psychological satisfaction with life and well-being of older adults living in nursing homes [53]. It is expected that the use of interventions that increase positive effect, such as laughter therapy, will have positive effects on nursing students during the pandemic process in which their uncertainty, fear, and anxiety about the future increased. Reaching large masses, especially with laughter therapy, would be effective in reducing the negative feelings of senior students, who will be nurses in the future, increase their satisfaction with life and psychological well-being.

## 5. Conclusion

The findings of the current study suggest that 10 sessions of online laughter therapy exercises can be used as complementary therapy in reducing anxiety levels in nursing students, increasing life satisfaction

and psychological well-being. In addition, this non-pharmacological intervention with the element of "laughing for no reason" can help streamline processes on online platforms in situations with similar physiological mechanisms. Finally, because laughter therapy is a safe, affordable, and cost-effective therapy, it can be applied online to a wider student body.

## 6. Limitations

Since this study is limited to senior nursing students studying at a state university in the Western Black Sea region, the results cannot be generalized to all nursing students. Another limitation of this study is that there are differences in nursing education in Turkey during the pandemic process. The fact that some nursing faculties continue to the education with a hybrid system and have their senior students have a clinical practice, and our faculty continues with distance education during this process can be considered as a disadvantage.

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## CRediT authorship contribution statement

**C. Eraydin:** Conceptualization, Methodology, Resources, Investigation, Writing – original draft. **Ş.E. Alpar:** Conceptualization, Methodology, Writing – review & editing, Supervision. All authors revised and approved the manuscript.

## Ethical consideration

Institutional permissions were obtained from the Bülent Ecevit University Non-invasive Clinical Research Ethics Committee (18/11/2020-2219 numbered) and the faculty dean's office (20/11/2020-52334 numbered) where the study will be conducted. The study was registered at ClinicalTrials.gov (NCT04786483).

## Conflicts of interest

The authors declare no conflict of interest.

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