A TECHNOLOGICAL APPROACH TO PROTECT PRIMARY SCHOOL STUDENTS FROM COVID-19: A COMBINATION OF HEALTH PROMOTION MODEL AND ANIMATION SUPPORTED EDUCATION

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Abstract

The coronavirus disease 2019 (COVID-19) epidemic and related mutations, which affect the whole world, continue to increase globally. This crisis adversely affects school-age children's quality of life. This study aims to determine the effect of animation-supported education based on the health promotion model given to primary school-age students for protection from COVID-19 disease. The study was carried out between February and April 2022 following the experimental research criteria with the pre-test, post-test, and re-test control group. The sample consists of 148 students studying in the 4th grade at two schools deemed suitable for the conduct of the study. Data were collected using data collection materials, the descriptive questionnaire, and the General Child Quality of Life Scale. The mean age of all students participating in the study was 10.53±2.60. It has been determined that 36.0% of the students have not received any training on COVID-19 before, 32.4% of them did not take precautions to defend themselves from COVID-19 disease, and it is not possible to protect 48.4% of them from COVID-19 disease even if adequate precautions are taken. It was found that the difference between the pre-test, post-test, and re-test mean scores of the students in the experimental group on the quality of life scale was statistically significant (p<.05). It was determined that the mean of life quality increased immediately after the training but decreased in the measurements one month later. Education to be given to school-age children should be developed with animation-supported programs.

Keywords: Animation-supported Education, COVID-19, Healthy Life, School-age Children.

İLKOKUL ÖĞRENCİLERİNİ COVID-19'DAN KORUMAK İÇİN TEKNOLOJİK BİR YAKLAŞIM: SAĞLIĞI GELİŞTİRME MODELİ VE ANİMASYON DESTEKLİ EĞİTİM KOMBİNASYONU

Öz

Tüm dünyayı etkisi altına alan koronavirüs hastalığı 2019 (COVID-19) salgını ve buna bağlı mutasyonlar küresel olarak artmaya devam ediyor. Bu kriz okul çağındaki çocukların yaşam kalitesini olumsuz etkiliyor. Bu çalışma, COVID-19 hastalığından korunmak için ilkokul çağındaki öğrencilere verilen sağlığı geliştirme modeline dayalı animasyon destekli eğitimin etkisini belirlemeyi amaçlamaktadır. Çalışma Şubat-Nisan 2022 tarihleri arasında deneysel araştırma kriterlerine uygun olarak ön test, son test ve tekrar test kontrol gruplu olarak gerçekleştirilmiştir. Örneklem, çalışmanın yürütülmesi için uygun görülen iki okulda 4. sınıfta öğrenim gören 148 öğrenciden oluşmaktadır. Veriler, veri toplama materyalleri, tanımlayıcı anket ve Genel Çocuk Yaşam Kalitesi Ölçeği kullanılarak toplanmıştır. Araştırmaya katılan tüm öğrencilerin yaş ortalaması 10.53±2.60'tır. Öğrencilerin %36,0'sının daha önce COVID-19 ile ilgili herhangi bir eğitim almadığı, %32,4'ünün COVID-19 hastalığından korunmak için önlem almadığı, %48,4'ünün ise yeterli önlem alınsa bile COVID-19 hastalığından korunmasının mümkün olmadığı tespit edilmiştir. Deney grubundaki öğrencilerin yaşam kalitesi ölçeği ön-test, son-test ve tekrar-test puan ortalamaları arasındaki farkın istatistiksel olarak anlamlı olduğu bulunmuştur (p<.05). Yaşam kalitesi ortalamasının eğitimden hemen sonra arttığı ancak bir ay sonraki ölçümlerde azaldığı tespit edilmiştir. Okul çağındaki çocuklara verilecek eğitim animasyon destekli programlarla geliştirilmelidir.

Anahtar kelimeler: Animasyon Destekli Eğitim, COVID-19, Sağlıklı Yaşam, Okul Çağı Çocukları.

1. INTRODUCTION

The new type of Coronavirus Disease (COVID-19), which was first seen in Wuhan, China on December 2019, and officially declared an "epidemic" on March 11, 2020, forced countries to take precautions and create the necessary conditions for living with it for a long time. After March 2020, measures to contain and prevent the epidemic became the main agenda of all countries. While workplaces, schools and other public places were closed, students had to take a break from their "face-to-face" education life for a while. Because educational institutions had been identified as risky areas that accelerate the spread of COVID-19 disease worldwide (1). This situation led to the decision to conduct the education given in primary schools distance and online education from November 20, 2020, until January 4, 2021. Then, depending on the epidemic process, education and training activities were carried out face-to-face at certain stages and online at certain stages (2,3).

With the schools re-starting face-to-face education, it should be ensured that school-age children continue their education in a safe and healthy environment. Training and notifications to understand COVID-19, how the disease spreads, and how we can protect ourselves from the disease is one of the important steps to be taken in determining the procedures and protocols related to the fight against the epidemic. Primaly, school-age children must understand what the disease is in order to comply with the rules set for protection from covid-19 disease (4). One of the methods that can be used to inform school-age children about COVID-19 is animations created within the scope of play therapy because animations provide psychomotor, cognitive, social, and emotional development of children and give them positive behaviors and habits (5,7). Nurses, who are closely related to all segments of the society, have important roles and responsibilities in order to gain behaviors towards protection from COVID-19 disease. Because nurses are in close and long-term communication with children. In addition, nurses have a role in providing protection from the epidemic by providing evidence-based information based on needs (8). It is appropriate for nurses to benefit from the "health promotion model", which is among the nursing theories and developed by Pender, in education and information activities. It has guiding qualities in providing positive behavior change, especially in school-age children, for the prevention of COVID-19 disease, which is structured with the theory of health promotion (9,10). In line with this information, the aim of this study is to determine the effect of the education created by combining the health promotion model and animation support in order to prevent the covid-19 disease on school-age children.

2. MATERIAL AND METHODS

2.1. Sample / Setting

This study was conducted as experimental research with the pre-test, post-test, and re-test control group (Clinicaltrials.gov Identifier: NCT05633485). This study was conducted in schools affiliated with the Directorate of National Education in a province in the southeast region of Turkey between February and April 2022. The study population consists of 4th-grade primary school students studying in schools affiliated with the Siirt Directorate of National Education. The sample consisted of 4th-grade students from two schools deemed suitable for conducting the study. A school constituted the experimental group and another school control group, and a lottery method was used to determine the groups. In the G-Power analysis performed to calculate the sample size, at least 71 participants in each group were identified with an effect size of 0.610, 95% confidence interval (1-α), and 80% test power (1-β). However, considering possible losses in the groups, three more participants (with a 5% increase) were included in each group, and the groups consisted of 74 students. The criteria for inclusion in the study were determined as being at the school between the research dates, and volunteering of the students and their parents to participate in the study. Exclusion

criteria were determined as the presence of any health problems in terms of communication of the participant.

2.2. Data Collection Tools

Data were collected using data collection materials, a descriptive questionnaire and generic quality of life instrument for children (Kid-KINDL).

Descriptive Questionnaire: This form was developed by the researchers in line with the literature (15,17) and consists of 10 questions. In the form, there are five questions about the students' socio-demographic characteristics and five queries about their knowledge and perceptions of the COVID-19 disease.

Generic Quality of Life Instrument for Children (Kid-KINDL): This instrument was developed by Ravens-Sieberer and Bullinger (1998), and Eser et al. (2008) and adapted into Turkish (11,12). The questionnaire consists of 6 subscales; Physical state, psychological well-being, self-worth, family, friend, and school subscales. The scale consists of 30 items in a 5-point Likert type. High scores indicate a healthy quality of life. The total Cronbach's alpha internal consistency value of the scale was 0.78 (12). The calculated Cronbach's alpha internal consistency value in this study was 0.83.

2.3. Data Process

The pilot testing applied to 15 students, who constitute 10.0% of the sample. After pilot testing, the data collection tool evolved to its final form. The data collected in the pilot study were not included in the study. Before the application of the questionnaire, the students in the experimental and control groups were given information about the data collection forms. Questionnaires were filled out one month after the animation videos were watched by the experimental group. On the other hand, the control group students filled out the questionnaire simultaneously with the experimental group without watching the animation videos.

2.4. Creation of Animations and Educational Content

Creation of animation videos: The researchers prepared training modules for the content of the videos. The content of the prepared training modules was presented to experts for their opinions and suggestions. In line with the recommendations, the content of the training modules was edited, and the videos were created. For the design of animation videos in computer environment, support was received from professional people whose working area is computer software. The videos prepared are compatible with computers, tablets, and mobile devices and allow students to watch them easily on any platform.

Creation of educational animation videos: The educational content of the videos consists of five sections: the definition of COVID-19 and how it is transmitted, social distance, how to use a mask, and what should be considered in hygiene and nutrition in COVID-19. The average length of each animation is five minutes. The link to the videos is available. (https://disk.yandex.com.tr/d/i2FCsM0_RsR7uA). A representative visual from the videos is given in Figure 1.

Figure 1. A Representative Image from The Videos

Creating the training content based on the health promotion model: Considering the behavioral-specific cognitive processes and their effects in Pender's model, educational content for COVID-19 disease prevention has been created.

2.5. Implementation of Training Program According to The Health Promotion Model

Personal characteristics and experiences: The individual characteristics of the students (e.g, fear of COVID-19, hygiene habits, not contagious thoughts) and previous experiences of health-promoting behaviors (e.g., having individuals with COVID-19 in the family) were recorded. Afterward, missing information was identified, and these missing points were handled.

***Behavior-specific concepts and effects:*** The training program included the following perceptions (13).

- Perceived benefits: Methods of protection from COVID-19 infection (e.g., mask, hygiene, social distance),
- Perceived obstacles: False information about removing negative perceptions about COVID-19 infection,
- Perceived self-efficacy: To strengthen self-efficacy, draw attention to the fact that students can be protected from COVID-19 infection if they wear masks, pay attention to hygiene rules and social distance, and include success stories about this,
- Activity-related effects: Students feelings that they will not be infected if they carefully apply the methods of protection against COVID-19 infection,
- Interpersonal interaction (family, peers, teachers, health personnel): Creating animation content by considering the interactions in the family and school environment, creating peer groups by paying attention to the social distance rules for motivation,
- Situational effects: It is to include what can be done in case of problems that may occur during the application of protection methods, such as "what should we do when the mask is torn?, what should we do when we see someone who does not pay attention to social distance?, and what should we do if there is no soap in our area?"
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c. Behavioral output (exhibiting the recommended behavior): The following perceptions are included in this behavior output.

- Behavioral planning: It is the stage where individuals decide to apply protection methods.
- Urgent needs and priorities: Obligation to wear a mask before going out, cleaning hands with water or soapy water, paying attention to the social distance at all times and everywhere,

- Health promotion behavior: It is the individual's gaining the expected health promotion behavior and making it a lifestyle.

The components in the model have a direct or indirect effect on the health behaviors exhibited in the prevention of COVID-19. The indirect or direct effect of the components on each other is shown in Figure 2.
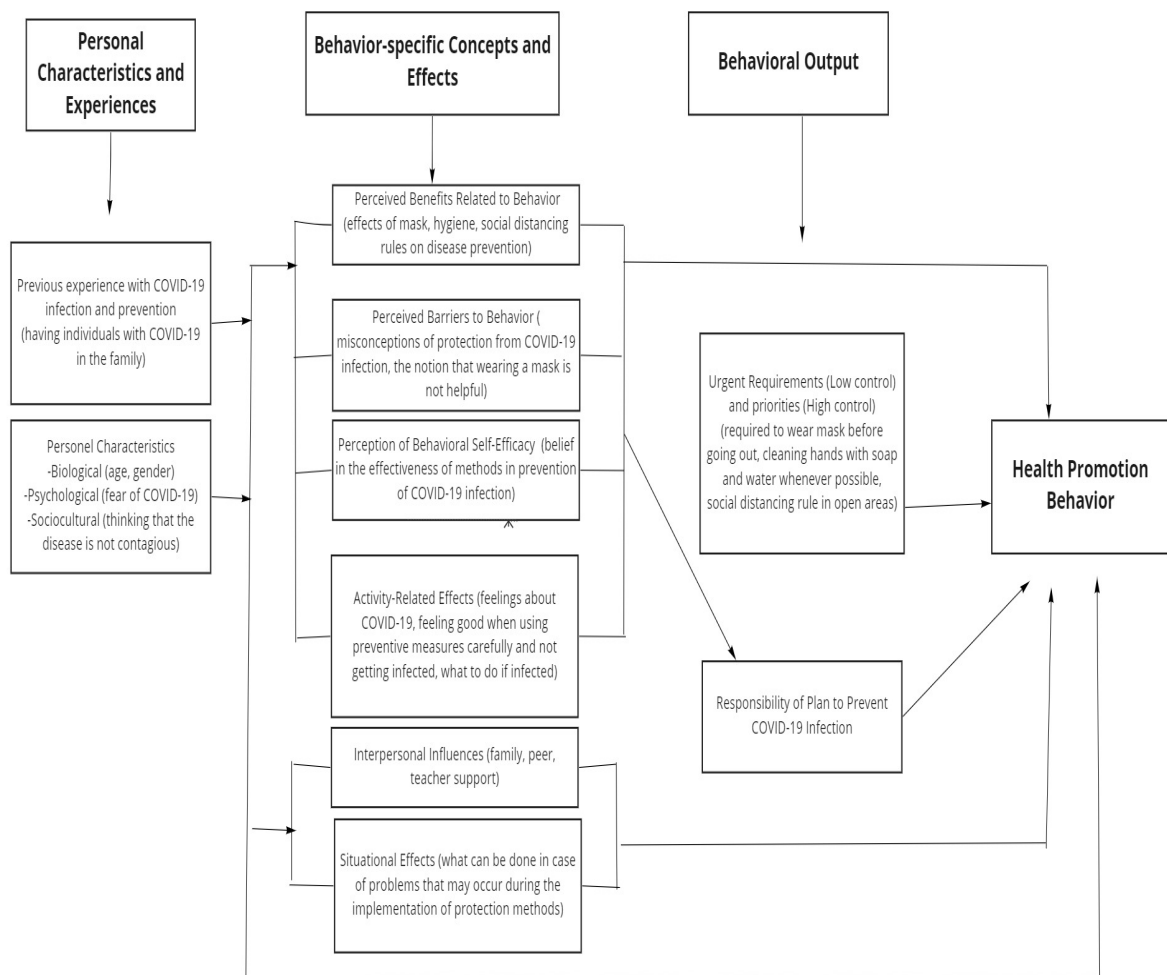
Figure 2. Management Model of Prevention from COVID-19 Infection

2.6. Statistical Analysis

IBM SPSS Statistics for Windows. Version 22.0 (Statistical Package for the Social Sciences, IBM Corp., Armonk, NY, ABD) package program was used for the statistical analysis of the data obtained from the study. Study data (mean, standard deviation (S.D.), and frequency) were utilized to evaluate the quantitative data between the two groups. Independent groups t-test was performed to compare the groups according to their scores. ANOVA test was employed to determine the change in pre-test, post-test, and re-test measurements according to time. Bonferroni test was applied to determine which group caused the difference between the groups. The results obtained from the analysis were interpreted at confidence interval of 95%, and the significance level of $p < .05$.

2.7. Ethical Approval

This study was designed based on the principles of the Declaration of Helsinki. Ethics committee approval (no:11016, dated 30.06.2021) from Siirt University Non-Interventional Ethics Committee and written permission (no: 15991, dated 11.08.2021) from Siirt Provincial Directorate of National Education was granted to carry out the research. The students and their parents who participated in the study were informed about volunteering, and their written consent was obtained after they read the consent form.

3. RESULTS

A total of 148 students were enrolled; their socio-demographical characteristics are shown in Table 1. 53.4% of the students participating in the study were girls, 46.6% were boys, and the mean age of all participants was 10.53±8.63. 26.3% of the mothers and 36.9% of the fathers of the participants are primary school educational status. It was found that 14.8% of the participants had a chronic disease. It was determined that both groups were similar (p>.05) (Table 1).

Table 1. Distribution of Participants in the Experimental and Control Groups by Socio-demographical Characteristics

Characteristics	Experimental n=74 (%)	Control n=74 (%)	Total N=148 (%)	Test χ^2	Significance p
Gender					
Female	39 (52.7)	40 (54.1)	79 (53.4)	0.510	.475
Male	35 (47.3)	34 (45.9)	69 (46.6)		
Mother's education					
Illiterate	13 (18.5)	11 (14.8)	24 (16.6)		
Literate	25 (35.3)	28 (39.8)	53 (37.5)	3.536	.171
Primary school	20 (26.6)	19 (25.8)	39 (26.3)		
High school and above	16 (19.6)	16 (19.6)	32 (19.6)		
Father's education					
Illiterate	4 (5.5)	3 (4.8)	7 (5.1)		
Literate	17 (23.2)	21 (28.8)	38 (26.1)	4.378	.342
Primary school	26 (35.6)	28 (38.3)	54 (36.9)		
High school and above	27 (35.7)	22 (28.1)	49 (31.9)		
Chronic disease					
Yes	10 (7.4)	12 (8.8)	22 (14.8)	3.218	.265
No	64 (92.6)	62 (91.2)	126 (85.2)		
Age	$X \pm S.D.$ 10.38±4.40	$X \pm S.D.$ 10.86±3.30	$X \pm S.D.$ 10.53±2.60	12.05*	.168

* One-way analysis of variance in independent groups. χ^2 = chi-square test, X= Mean, S.D.= Standard Deviation.

The study findings revealed that 36% of the participants had not received any training on COVID-19 before. On the other hand, the information source of the trainees was their parents (26.3%). The transmission route of the disease was determined as "coughing-sneezing (35.3%)" and "putting the hand to the mouth (27.3%)". 32.4% of the participants did not take adequate precautions to protect from COVID-19 disease. The protection methods of the participants who take precautions were "wearing masks (48.4%)" and "paying distance (22.5%). 48.4% of the participants stated that it is not possible to be protected from COVID-19 infection even if adequate precautions are taken. When the experimental and control group participants were compared in terms of their knowledge and perceptions of COVID-19 disease, the results displayed that both groups were similar (p>.05) (Table 2).

Table 2. Distribution of Information about COVID-19 Disease among Experimental and Control Group Participants

Characteristics	Experimental n=74 (%)	Control n=74 (%)	Total N=148 (%)	Test χ^2	Significance p
Getting an education					
Yes	48 (65.2)	47 (63.8)	95 (64.0)	0.340	.275
No	26 (34.8)	27 (36.2)	53 (36.0)		
Information source (n=95)					
Parent	12 (25.0)	13 (27.6)	25 (26.3)		
Tv, Internet	11 (22.9)	10 (21.2)	21 (22.1)	2.564	.145
Teacher	10 (20.8)	8 (17.0)	18 (18.9)		
Healthcare professional	9 (18.7)	9 (19.1)	18 (18.9		
Friend	6 (12.6)	8 (15.1)	14 (13.8)		
Transmission route of the disease*					
Coughing-sneezing	32 (35.6)	34 (35.1)	66 (35.3)		
Hand to mouth	23 (25.6)	28 (28.9)	51 (27.3)	8.387	.116
Kissing, hugging, cuddling	20 (22.2)	23 (23.7)	43 (23.0)		
Sitting side by side	15 (16.6)	12 (12.4)	27 (14.4)		
Precautions to protect from COVID-19					
Yes	52 (70.1)	48 (64.9)	100 (67.6)	3.617	.443
No	22 (29.9)	26 (35.1)	48 (32.4)		
Actions taken (n=100)*					
Wearing a mask	45 (48.4)	43 (48.3)	88 (48.4)	1.999	.368
Distance	20 (21.5)	21 (23.6)	41 (22.5)		
Cleaning	18 (19.4)	13 (14.6)	31 (17.0)		
Not sharing stuff with friends	10 (10.7)	12 (13.5)	22 (12.1)		
Perception of being protected from COVID-19					
Yes	36 (48.6)	40 (54.1)	76 (51.6)	2.851	.228
No	38 (51.4)	34 (45.9)	72 (48.4)		

* More than one answer was given. χ^2 = chi-square test

The comparison of the mean scores of the pre-test scale total scores and sub-dimensions of the experimental group and control group participants revealed that the difference between the groups was not statistically significant (p>.05). When the post-test and re-test mean scores of the participants were evaluated; it was determined that the difference between the experimental and control groups was statistically significant in terms of Kid-KINDL total scale score, and physical state, psychological well-being, and self-worth scores among sub-dimensions (p<.05). The differences mean scores of Kid-KINDL total scale and physical state, psychological well-being, and self-worth scores among sub-dimensions of the students participating in the experimental group were found to be statistically significant between pre-test, post-test, and re-test (p<.05) (Table 3). Paired comparisons performed to understand the source of this difference demonstrated that the difference between the post-test and re-test was statistically significant (p<.05).

Table 3. Differences Between and within Groups of Generic Child Quality of Life Scores and Subscale Scores in terms of Pre-test, Post-test, and Re-test

Kid-KINDL Scale	Pre-test (n=74) X±S.D.	Post-test (n=74) X±S.D.	Re-test (n=74) X±S.D.	Significance F	p
Physical state					
Experimental	77.22±18.10	82.34±20.34	80.42±17.09	28.457	**<.001**
Control	79.08±19.13	76.43±18.38	75.23±15.56	11.517	.228

Significance	t= 2.345 p=.745	t= 4.945 p= **<.001**	t= 3.765 p= **<.001**		
Psychological well-being					
Experimental	77.42±11.81	81.49±10.25	79.42±7.91	18.557	**.012**
Control	76.18±9.84	74.21±8.83	74.42±15.56	10.370	.604
Significance	t=-0.135 p=.163	t=-2.321 p= **.032**	t= -5.763 p= **.023**		
Self-worth					
Experimental	59.51±19.41	62.16±16.26	60.02±13.91	23.289	**.003**
Control	53.43±13.32	55.86±13.95	52.21±12.51	18.586	.545
Significance	t= 2.954 p=.064	t= 2.837 p= **.033**	t= 4.523 p= **.021**		
Family					
Experimental	72.42±11.75	73.42±10.34	74.51±17.09	38.351	.129
Control	74.45±12.34	76.03±11.38	75.31±12.56	31.360	.556
Significance	t= 2.198 p=.053	t= 3.345 p= .439	t= 2.574 p= .115		
Friend					
Experimental	57.77±16.39	55.42±19.34	55.42±14.19	53.505	.375
Control	59.81±14.21	58.63±17.38	58.32±12.36	51.329	.684
Significance	t= 0.345 p=.681	t= 4.945 p= .774	t= 3.765 p= .429		
School					
Experimental	67.12±14.76	65.28±17.44	65.21±13.23	20.432	.297
Control	63.23±13.42	64.75±12.82	65.41±11.37	23.134	.129
Significance	t= 1.995 p=.186	t= 1.732 p= .271	t= 1.452 p= .114		
Chronic disease					
Experimental	63.09±8.11	63.34±6.24	63.42±7.09	30.831	.341
Control	62.81±9.13	61.43±8.38	61.88±8.42	23.219	.809
Significance	t=-0.251 p=.803	t=-0.557 p= .581	t= -0.768 p= .318		
Scale Total					
Experimental	67.79±14.41	70.92±13.34	68.34±14.92	28.457	**.022**
Control	66.99±13.05	66.76±14.38	65.32±13.26	11.517	.397
Significance	t= 2.839 p=.271	t= 3.002 p= **.032**	t= 2.625 p= **.025**		

X= Mean, S.D.= Standard Deviation, t= Independent groups t-test, F= Repeated measures ANOVA test

4. DISCUSSION

The resulting uncertainties and problems negatively affect the quality of life of school-age children while the COVID-19 epidemic and the associated increasing mutations continue globally. In the stress and anxiety environment caused by the COVID-19 pandemic, school-age children try to obtain knowledge about the COVID-19 disease from accurate and inappropriate information sources (14). In this study, the effect of animation supported education prepared for the prevention of COVID-19 disease on the quality of life of school-age children was examined.

Quality of life in children is an important concept that includes objective and subjective evaluations. The self-reported quality of life scores of the students participating in the study were

67.79±14.41 for the experimental group and 66.99±13.05 for the control group. The findings regarding the subscales of the instrument indicated that the highest average score was physical state and psychological well-being, respectively. In one study, the mean scores of children's quality of life was determined as 67.82 ± 1.93 (15), and 75.59 ± 10.18 in another study (16) in which the same measurement tool was used. This study conducted during the pandemic period revealed that the mean quality of life score of children was 73.91 ± 8.44. Since the Kid-KINDL scale does not have measurement limitations, high average scores (score range 0-100) imply a high life quality level (17). The scores obtained in this study indicate that the quality of life of the children is moderate.

Due to the rapid spread of technology, educational applications with digital content are one of the issues that should be emphasized (18). These practices have advantages such as drawing the participants' attention, increasing their willingness to participate in the training, and facilitating the achievement of the goals (19). The pre-test, post-test, and re-test mean score comparison of the experimental group revealed that the total post-test and re-test scores were higher than the pre-test mean scores. The difference between them was statistically significant. The analysis of the subscales demonstrated a similar significance in the subscales of physical state, psychological well-being, and self-worth. Thus, it turns out that animation-supported education is effective. While the control group post-test and re-test mean scores did not change because the students in the control group were not given training on COVID-19 disease and prevention, the post-test mean scores increased due to the education given to the experimental group students. The significant decrease in the post-test mean scores of the experimental group compared to the re-test mean score reveals the importance of repeating the training. It is thought that the finding that one out of every three participants in the study has never received training on protection from COVID-19 disease contributes to this result. The study by Benzing et al. showed that children who followed the recommendations during the COVID-19 pandemic had a better overall quality of life than those who did not (20). In the study conducted by Widyaningsih et al., it was reported that at the end of the online education program for children in the COVID-19 pandemic, most children had a better emotional state, interacted more with their peers, thus increasing their quality of life (21). Studies have emphasized that the information learned, especially in children's age groups, tends to be forgotten over time and that education should be repeatable (22,23).

This study has limitations as it was conducted in only two schools and included 4th-grade students in primary school.

5. CONCLUSION

In line with the findings obtained from the study; although the quality of life level of the students participating in the experimental group increased immediately post education, it decreased one month later. It has been determined that animation-supported education based on the health promotion model given to primary school students to prevent COVID-19 disease is effective in improving life quality.

In line with these results , it is necessary to conduct research on the reduction in quality of life after the first year of the pandemic. Digital-supported education with animation should be included in health promotion, disease prevention, and early intervention programs to support children seriously affected by the epidemic. In addition, the findings of the study are important in terms of being

prepared for possible future pandemics and providing training in possible pandemics. It can be recommended that these training programs be repeatable and long-term.

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