

ORIGINAL ARTICLE / ORIJINAL MAKALE

## The Effect of Ventrogluteal Intramuscular Injection Training with Animated Video Containing Subliminal Messages: A Randomized Controlled Study

Subliminal Mesaj İçeren Animasyonlu Videolu Ventrogluteal İntramusküler Enjeksiyon Eğitiminin Etkisi: Randomize Kontrollü Bir Çalışma



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### Abstract

**Background:** In the literature, there is increasing interest in the effects of subliminal stimuli on humans.

**Objectives:** To investigate the effects of the positive subliminal messages placed in a video used for ventrogluteal intramuscular injection training of nursing students on students' remembering, anxiety, self-confidence, general self-efficacy and practice skill levels.

**Methods:** The population of the randomized controlled study conducted between 9-10 October 2018 consisted of first year nursing students at a faculty of health sciences (n=64). An animated video on ventrogluteal intramuscular injection that contained subliminal messages was shown to the students in the experiment group. In the study, the students in the control group were given only practice together with the theoretical education on the subject. A Student Information Form, Trait-State Anxiety Scale, General Self-Efficacy Scale, Self-Confidence Scale, and Ventrogluteal Intramuscular Injection Practice Skill Evaluation Form were used. In the study, the independence Chi-square test was used to compare the experiment and control groups.

**Results:** Although statistically non-significant ( $p>0.05$ ), identifying ventrogluteal intramuscular injection sites (n=21, 33.9%) and proper injection technique (n=22, 35.5%) steps were remembered more by students in the experiment group. It was found that ventrogluteal intramuscular injection practice skill was at 'adequate' level in the experiment group (n=21, 35%).

**Conclusion:** Visual subliminal messages used in ventrogluteal intramuscular injection training have no effect on nursing students' anxiety, self-confidence, and general self-efficacy levels. Basic nursing skill applications can be prepared with animated videos in a way to attract students' attention.

**Keywords:** Anxiety, Animated Videos, Nursing Education, Subliminal Messages, Ventrogluteal Intramuscular Injection.

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**Öz**

**Giriş:** Literatürde bilinçaltı uyaranların insanlar üzerindeki etkilerine artan bir ilgi vardır.

**Amaç:** Hemşirelik öğrencilerinin ventrogluteal kas içi enjeksiyon eğitimi için kullanılan bir videoya yerleştirilen olumlu bilinçaltı mesajların öğrencilerin hatırlama, kaygı, özgüven, genel öz-yeterlik ve uygulama beceri düzeylerine etkisini araştırmaktır.

**Yöntem:** 9-10 Ekim 2018 tarihleri arasında yürütülen randomize kontrollü çalışmanın örneklemini bir sağlık bilimleri fakültesi birinci sınıf hemşirelik öğrencileri (n=64) oluşturmuştur. Deney grubundaki öğrencilere subliminal mesajlar içeren ventrogluteal kas içi enjeksiyon ile ilgili animasyonlu bir video izletilmiştir. Çalışmada kontrol grubundaki öğrencilere ise konu ile ilgili teorik eğitim ile birlikte sadece uygulama yaptırılmıştır. Öğrenci Bilgi Formu, Sürekli Durumluk Kaygı Ölçeği, Genel Öz-yeterlik Ölçeği, Kendine Güven Ölçeği ve Ventrogluteal İntramusküler Enjeksiyon Uygulama Becerisi Değerlendirme Formu kullanılmıştır. Araştırmada deney ve kontrol gruplarının karşılaştırılmasında bağımsız Ki-kare testi kullanılmıştır.

**Bulgular:** Deney grubundaki öğrenciler istatistiksel olarak anlamlı olmasa da ( $p>0.05$ ), ventrogluteal intramusküler enjeksiyon yerlerinin belirlenmesi (n=21, %33.9) ve uygun enjeksiyon tekniği (n=22, %35.5) adımları daha fazla hatırlandı. Deney grubunda (n=21, %35) ventrogluteal kas içi enjeksiyon uygulama becerisi ‘yeterli’ düzeyde olduğu bulundu.

**Sonuç:** Ventrogluteal intramusküler enjeksiyon eğitiminde kullanılan görsel bilinçaltı mesajların hemşirelik öğrencilerinin kaygı, özgüven ve genel öz-yeterlik düzeylerine etkisi yoktur. Temel hemşirelik beceri uygulamaları öğrencilerin dikkatini çekecek tarzda animasyonlu videolarla hazırlanabilir.

**Anahtar Kelimeler:** Kaygı, Animasyonlu Videolar, Hemşirelik Eğitimi, Subliminal Mesajlar, Ventrogluteal Kas İçi Enjeksiyon.

**INTRODUCTION**

Nursing is a discipline that requires cognitive, psychomotor, and attitudinal behaviors. Thus, nursing education requires the use of innovative practices and teaching methods that cover cognitive, sensorial, and psychomotor learning domains sufficient enough for students to gain their skills (Kızıl ve Şendir, 2019). Intramuscular (IM) injection is one of the most important basic nursing skills that should be acquired at the highest level.

Although IM injection is one of the most frequently used drug delivery methods in healthcare institutions, it may cause various complications if not applied to the right place with the proper method (Kara ve ark., 2015; Kaya ve ark., 2015). For this reason,

ventrogluteal IM injection training gains importance rather than dorsogluteal IM injection in the basic nursing skills training both in our country and around the world (Emre Yavuz ve Karabacak, 2011; Greenway, 2004). Although ventrogluteal IM is a safe method, it requires proper identification of the injection site (Kaya ve ark., 2015). For this reason, using various visual training materials, in addition to demonstration, is important for ventrogluteal IM injection training.

Today, besides using traditional methods such as demonstration methods and skill check lists for nursing skill training, methods such as real clinical scenarios, role play, animated videos, and simulation are also being used widely (Erdem ve Sarı, 2018; Gündoğdu ve Dikmen, 2017; Kızıl ve Şendir, 2019). Technology has

an important role in skill development training. Videos, elements of technology, are facilitators for learning the basic skills of nursing (Metev Uysal, 2010). Educational videos are defined as pedagogic tools and are considered to combine theory and practice. They provide bidirectional communication by acting both as a source of information and a tool of demonstration because they give visual and audio input simultaneously to students. Using videos for educational purposes has positive effects such as cognitive benefits (good learning, retention, remembering), psychological benefits (motivation, pleasure of learning) and ease of visualizing knowledge. Using videos throughout the learning process allows students to compose significant intellectual activities and develop interpretation, critical thinking, problem-solving, and cognitive skills. Moreover, using videos as educational material has a positive effect on the students' motivation (Akın Korhan ve Üstün, 2015; Pekdağ, 2010).

Consciousness is the state of mind that can discern inner and external sensations. Content of consciousness is transferred to the external environment by speech or behavior. The state of 'subconsciousness' is defined as the state in which some things that are heard or sensed are not processed at the level of consciousness, yet are recorded and saved by the brain, and then this information is effective in decisions and behaviors (Özcan ve ark., 2015; Prague, 2003).

Subconscious (subliminal) or unconscious messages plant the desired information to the subliminal area without being noticed by using various visual, auditory, and written techniques (Tıǧlı, 2012). Subliminal messages direct individuals to the unknown and thus affect individuals by presenting the transmitted information below the required level of consciousness (Greene ve Herzberg, 2010).

Subliminal messages are mostly used in videos in the form of small pixels that are too fast to be perceived by the eyes or in words, sounds, and pictures that are short enough to be only perceived at the subconscious level (Darıcı, 2015; Goodman, 2006). Subliminal messages are commonly used in advertising; the purpose of subliminal messages in this sector is subliminal persuasion (Sungur, 2007).

The subconscious records the images, sounds, and even smells that cannot be perceived by the consciousness. Human behavior and emotions are shaped based on these records that are stored in the subconscious. Subliminal messages used in advertising, marketing, movies, and cartoons, propaganda, and music are some very concrete examples of the messages that affect the subconscious (Darıcı, 2015; Küçükbezirci, 2013). Although subliminal messages are commonly used in marketing and advertising (Darıcı, 2015; Sungur, 2007; Tıǧlı, 2012), there are no examples of its use in nursing education in our country or in the world. Accordingly, this study was designed to identify the effects of subliminal messages on ventrogluteal IM training. Therefore, in our study, it was aimed to produce an effect on the students by transferring the information in the animated video for ventrogluteal IM injection skill training to the nursing students on a subliminal level.

### *Hypotheses of research*

H<sub>0</sub>: Subliminal messages used in an animated video for ventrogluteal IM injection training have no effect on the state-trait anxiety, general self-efficacy, self-confidence, and ventrogluteal IM injection practice skill levels of students.

H<sub>1</sub>: Subliminal messages used in an animated video for ventrogluteal IM injection training are effective on the state-trait anxiety, general self-efficacy, self-confidence and ventrogluteal IM

injection practice skill levels of students.

## **METHODS**

### ***Type of the Research***

The research is a randomized-controlled study. The study complied with the guidelines of Consolidated Standards of Reporting Trials (CONSORT) Checklist.

### ***Place of the Research***

The research was conducted in Amasya University, Faculty of Health Sciences.

### ***Sample of the Research***

The population consisted of first year nursing students (N = 64). Accordingly, when predicting standard deviation (S) as 0.5 in 95% (1- $\alpha$ ) confidence interval with an error rate of 5% (d), the sample size formulas with a known population are (19);  $n = n_0 / 1 + n_0 / N$  and  $n_0 = (tS / d)^2 N$ : Population size, t: Table value corresponding confidence level, d: Deviation, gap width to be tolerated,  $n_0$ : Best prediction for sample size, S: Standard deviation predicted for the population (Büyüköztürk ve ark., 2014). By using these formulae, the sample size was calculated approximately as 55 people. Given that the number of participants of the study was 62, it is seen that a sufficient sample size was reached in terms of generalizability. All of the first year nursing students studying at the faculty in which the research was held were aimed to be involved in the research in accordance with the criteria for inclusion (taking the Basic Principles and Practices of Nursing class for the first time, being voluntary to participate in the study, and being present at school at the day of study). Students were divided into two groups as the experiment (n = 33) and control (n = 29) groups. A randomization method generated by a computer program was used to assign students to the experiment and control groups (<http://randomization.com>). A ventrogluteal IM

injection training animated video that included subliminal messages was shown to the students in the experiment group. The students in the control group watched a ventrogluteal IM injection training animated video that had no subliminal messages.

### ***Data Collection Instrument-Validity and Reliability Information***

In the study, Student Information Form, The State-Trait Anxiety Scale, General Self-Efficacy Scale, and Self-Confidence Scale were used.

*Student Information Form:* This form consisted of seven items questioning information such as sex, status of having received previous ventrogluteal IM injection training, information recognized from the ventrogluteal IM injection training animated video, anything that attracted attention in the video, and the status of enjoying the video.

*State-Trait Anxiety Scale:* The scale developed by Spielberger et al. (1970) was adapted into Turkish by Öner and Le Compte (1988). The scale consists of two dimensions with a total of 40 items based on two-factor anxiety concept. The first 20 items constitute "State Anxiety Scale," which indicates the level of anxiety of an individual based on how they define their feelings at a specific moment and under certain conditions. Items 21-40 constitute the "Trait Anxiety Scale," showing how an individual feels in general; in other words, it measures an individual's general anxiety level. The potential score interval is 20-80 for both dimensions. There are four different options for each item to be marked by the participants. These options are "Never," "Sometimes," "Frequently," and "Almost always," which are used to identify the intensity of the expressed emotions and behaviors. The total scores from the two scales vary. Higher scores indicate greater anxiety and



lower scores indicate lower anxiety (Öner and Le Compte, 1988). Cronbach's alpha coefficients in the English and Turkish versions of the scale are, respectively, 0.94 and 0.83-0.87 for constant anxiety, and 0.94 and 0.94-0.96 for state anxiety. Cronbach's alpha coefficients in this study are as follows: 0.644, 0.796, and 0.768 for pre-video, post-video, and post-practice for the State Anxiety Scale, and 0.476, 0.566, and 0.602 for pre-video, post-video, and post-practice for the Trait Anxiety Scale, respectively.

*General Self-Efficacy Scale:* The Turkish validity and reliability of the scale developed by Sherer et al. (1982) has been shown by several authors (Gözüm ve Aksayan, 1999; Yıldırım ve İlhan, 2010). The last Turkish version of the scale, for which the validity and reliability were tested by Yıldırım and İlhan (2010), was used in this study. Each item of the scale is scored between 1-5 points. Item numbers 2, 4, 5, 6, 7, 10, 11, 12, 14, 16, and 17 are reverse scored. The total score of the scale ranges between 17 and 85 points. Higher scores indicate an increase in self-efficacy belief (Yıldırım ve İlhan, 2010). Cronbach's alpha coefficient is 0.86 for the original scale and 0.80 for the Turkish version (Yıldırım ve İlhan, 2010). In this study, pre-video, post-video, and post-practice Cronbach's alpha coefficients were 0.357, 0.530, and 0.629, respectively.

*Self-Confidence Scale:* The scale developed by Akın (2007) is a five-point Likert scale consisting of 33 items. The highest and lowest scores that can be obtained from the scale are 165 and 33, respectively. High scores obtained from the scale, which has no negative items, indicate a high level of self-confidence (Akın, 2007). The Cronbach's alpha coefficient for the self-confidence scale was 0.83 in Akın (2007)'s study. In our study, Cronbach's alpha coefficients for pre-video, post-video, and post-practice were

0.940, 0.885, and 0.950, respectively.

*Ventrogluteal IM Injection Practice Skill Evaluation Form:* The form developed by the researchers included information on ventrogluteal IM injection practice skill and consisted of 17 items. The scoring of each item was different. Each student was given a total practice skill score after evaluating each item as 'Achieved' and 'Not achieved.' According to this, the scores were evaluated as 0-30: 'Inadequate,' 31-69: 'Needs improvement' and 70 and above: 'Adequate.'

### **Intervention**

The research was conducted in 9-10 October 2018 and three steps (Figure 1):

1. *Before watching the video:* A theory lesson on ventrogluteal IM injection practice was given to both the experiment and control groups at the same time by using a Power Point presentation and demonstration. The State-Trait Anxiety Scale, General Self-Efficacy Scale, and Self-Confidence Scale were administered before the watching the video.

2. *Video:* The video, prepared by the researcher who is also the instructor of the class on ventrogluteal IM injection, was turned into a five minute animated video by as animator-graphic designer. Another researcher, who is an expert on subliminal messages, received two copies of the video. Positive subliminal messages (smiley face emoji) were embedded into the video in 15 millisecond (ms) frames in 17 steps, as they occur at the beginning and the end of each step of the training. No subliminal messages were added to the video for the control group. The videos were shown to each group simultaneously in different classes in order to prevent interaction between the groups. Immediately after the video was shown, both groups were administered the State-Trait Anxiety Scale, General Self-Efficacy

Scale, and the Self-Confidence Scale, as well as the Student Information Form, which also questioned information about the training video.

Expert opinion was received from three people for the content and functionality of the video. A pilot study was conducted with 1st year students (n=28) in different groups. The content of the video included the following steps of the ventrogluteal IM injection procedure: “correct principles”, “positioning the patient”, “ensuring privacy”, “determining the IM site”, “administering the IM injection”, “positioning the patient”, “collecting the materials” and “recording the procedure”.

**3. Practice and post-practice:** Each student in experiment and control group was asked to perform ventrogluteal IM injection practice on the task trainer model in the nursing skill laboratory. Each student was evaluated during the practice by the researcher according to Ventrogluteal IM Injection Practice Skill Evaluation Form. Immediately after the practical assessment, steps that were missed or performed incorrectly were explained to each student by the researcher. The State-Trait Anxiety Scale, General Self-Efficacy Scale, and Self-Confidence Scale were administered to each student again after the practical assessment. In the practice; it took about 20 minutes for one student to apply all the procedures and fill out the forms.

### Evaluation of the Data

Microsoft Office Excel 2016 and the IBM SPSS Statistics 23 software were used for data analysis. The independence Chi-square ( $\chi^2$ ) test was used to compare the experiment and control groups. The independent sample t-test was used to compare pre-video, post-video, and post-practice self-confidence, general self-efficacy, and state-trait anxiety levels and skill levels of the students in the experiment and control group.

Spearman’s rho correlation coefficient was used to investigate the relationship of the socio-demographic characteristics of the students with their pre-video, post-video and post-practice self-confidence, general self-efficacy, and state-trait anxiety levels and skill levels.

### Ethical Aspect of the Research

It is obligatory to follow scientific and universal principles while conducting research. The Helsinki Declaration was abided by throughout the study. Consent was obtained from the Dean’s office and the Head of Department from where the research data were obtained, and the students were informed about the purpose and content of the research. Written approval was obtained from the Local Ethics Committee (12.06.2018/12). All students gave written informed consent. Permission was obtained for the scales used.

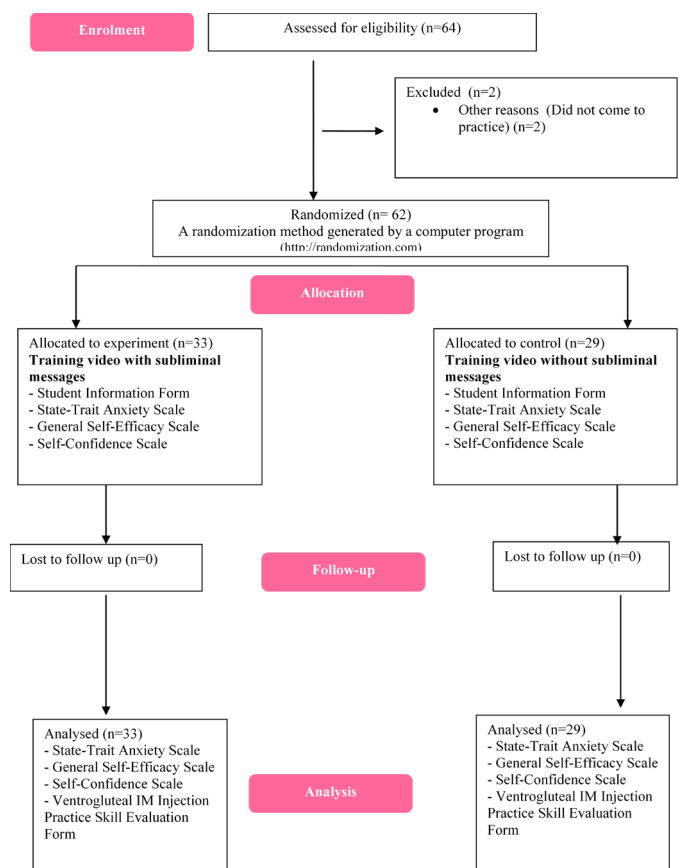


Figure 1. Flow-chart of study

## RESULTS

In the research, the experiment group comprised 53.2% (n = 33) and the control group included 46.8% (n = 29) of the nursing students. For both groups, 72.6% (n = 45) were female, 74.2% (n = 46) were graduated from high schools other than medical vocational high schools, 88.7% (n = 55) had not received previous ventrogluteal IM injection training (Table 1).

*Table 1. Distribution of socio-demographic characteristics of students*

	n	%
<b>Group</b>		
Control	29	46.8
Experiment	33	53.2
<b>Gender</b>		
Female	45	72.6
Male	17	27.4
<b>Graduated high school</b>		
Medical vocational high school	16	25.8
Other than medical vocational high school	46	74.2
<b>Have you received any training before?</b>		
Yes	7	11.3
No	55	88.7

After comparing how well the students in the experiment and control group remembered the process steps of ventrogluteal IM injection shown in the video, no statistically significant difference was found between the experiment and control group ( $p > 0.05$ ). However, it was identified that, although non-significantly, students in the experiment group remembered how to identify the ventrogluteal IM injection site (n = 21, 33.9%) and proper injection technique (n = 22, 35.5%) steps at a higher rate than students in the control group (Table 2).

No statistically significant difference was detected between the pre-video, post-video, and post-practice total mean scores of State Anxiety Scale, Trait Anxiety Scale, Self-Confidence Scale, and General Self-Efficacy Scale ( $p > 0.05$ ) (Table 3).

Although no statistically significant difference was present between the ventrogluteal IM injection practice skill levels of the students in the experiment and control group ( $p = 0.532$ ), it was identified that 35% (n = 21) of the students in the experiment group had an 'adequate' level of ventrogluteal IM injection practice skills (Table 4).

Table 2. Comparison of The Information Remembered By Students In The Experiment And Control Groups From The Video on Ventrogluteal IM Injection

Ventrogluteal IM injection practice steps	Group								
	Control		Experiment		Total		Significance		
	n	%	n	%	n	%			
Washing hands pre-practice	Yes	17	27.4	24	38.7	41	66.1	$\chi^2$	1.371
	No	12	19.4	9	14.5	21	33.9	SD	1
	Total	29	46.8	33	53.2	62	100.0	p	.242
Positioning	Yes	0	0.0	0	0.0	0	0.0	$\chi^2$	.
	No	29	46.8	33	53.2	62	100.0	SD	.
	Total	29	46.8	33	53.2	62	100.0	p	.
Equipment preparation	Yes	4	6.5	8	12.9	12	19.4	$\chi^2$	1.080
	No	25	40.3	25	40.3	50	80.6	Sd	1
	Total	29	46.8	33	53.2	62	100.0	p	.299
Determining of injection area	Yes	15	24.2	21	33.9	36	58.1	$\chi^2$	.900
	No	14	22.6	12	19.4	26	41.9	SD	1
	Total	29	46.8	33	53.2	62	100.0	p	.343
Cleaning of injection area	Yes	16	25.8	12	19.4	28	45.2	$\chi^2$	2.205
	No	13	21.0	21	33.9	34	54.8	SD	1
	Total	29	46.8	33	53.2	62	100.0	p	.138
Correct injection technique	Yes	17	27.4	22	35.5	39	62.9	$\chi^2$	.428
	No	12	19.4	11	17.7	23	37.1	SD	1
	Total	29	46.8	33	53.2	62	100.0	p	.513
Collection of equipment post-practice	Yes	14	22.6	19	30.6	33	53.2	$\chi^2$	.536
	No	15	24.2	14	22.6	29	46.8	SD	1
	Total	29	46.8	33	53.2	62	100.0	p	.464
Recording post-practice	Yes	3	4.8	5	8.1	8	12.9	$\chi^2$	.317
	No	26	41.9	28	45.2	54	87.1	SD	1
	Total	29	46.8	33	53.2	62	100.0	p	.573
Washing hands post-practice	Yes	11	17.7	6	9.7	17	27.4	$\chi^2$	3.025
	No	18	29.0	27	43.5	45	72.6	SD	1
	Total	29	46.8	33	53.2	62	100.0	p	.082

Table 3. Comparison of Pre-Video, Post-Video, and Post-Practice Self-Confidence, General Self-Efficacy, and State-Trait Anxiety Levels of Students in The Experiment and Control Groups

		Pre-video			Post-video			Post-practice		
		X±S	t <sup>#</sup>	p	X±S	t <sup>#</sup>	p	X±S	t <sup>#</sup>	p
SAS*	Control	40.41± 4.52	-.101	.920	40.00± 5.67	-.382	.704	39.60± 5.70	-.584	.562
	Experiment	40.55± 5.72			40.58± 6.20			40.48± 6.11		
TAS**	Control	45.03± 5.30	-.413	.681	44.14± 4.83	-.386	.701	43.70± 5.30	-.676	.502
	Experiment	45.55± 4.32			44.61± 4.68			44.61± 4.94		
SCS***	Control	129.03± 15.89	.927	.358	131.31± 20.06	1.186	.240	128.81± 17.67	.706	.483
	Experiment	124.73± 20.61			125.21± 20.36			125.30± 20.87		
GSES****	Control	67.93± 7.21	.408	.685	68.18± 8.72	.197	.845	67.82± 8.03	-.115	.909
	Experiment	67.00± 10.62			67.70± 10.40			68.09± 10.61		

\*State Anxiety Scale, \*\*Trait Anxiety Scale, \*\*\*Self-Confidence Scale, \*\*\*\*General Self-Efficacy Scale, #Independent sample t-test



Table 4. Comparison of Ventrogluteal IM Injection Practice Skill Levels of Students in Experiment and Control Group

		Group						Significance	p
		Control		Experiment		Total			
		n	%	n	%	n	%		
Ventrogluteal IM Injection Practice Skill Level	0-30: Inadequate	1	1.7	0	0.0	1	1.7	$\chi^2$	1.262
	31-69: Needs improvement	9	15.0	12	20.0	21	35.0	SD	2
	70 and above: Adequate	17	28.3	21	35.0	38	63.3	p	.532
	Total	27	45.0	33	55.0	60	100.0		

## DISCUSSION

Although the ventrogluteal area is more reliable than the dorsogluteal area, it is stated that when using the ventrogluteal area for IM, this area should be identified by a geometric method and factors such as sex and body mass index should be considered before the injection (Kaya et al., 2015). Thus, the efficiency of different teaching methods for ventrogluteal IM injection training should be tested by including these methods in nursing education curricula. In this direction, this study investigated the effects of subliminal messages in an animated video for ventrogluteal IM injection training for first year nursing students on their state-trait anxiety, self-confidence, general self-efficacy, and ventrogluteal IM injection practice skill levels.

In our research, it was identified that, although not statistically significantly, students in the experiment group remembered how to identify the ventrogluteal IM injection site and proper injection technique steps after the video at a higher rate than the control group. It is assumed that the 15 ms visual subliminal messages placed in the animated video shown to the experiment group could have been effective on this result. In a study that investigated whether being exposed to visual subliminal messages affected recognition, it was found that subjects exposed to 8-48 ms visual subliminal messages had better recognition (Seamon et al., 1984).

This information in the literature supports the results of our study. However, in another study investigating the effects of subliminal self-aid bands on academic success, no difference was found in the final exam scores of the participants (Russell et al., 1991).

In our research, no significant difference was detected in the pre-video, post-video, and post-practice state-trait anxiety, self-confidence, and general self-efficacy of the students in the experiment and control groups. According to this result, it can be stated that the visual subliminal messages in the animated video for ventrogluteal IM injection training were not effective. In the literature, no study has investigated the use of subliminal messages in nursing basic skill training. However, there are some studies in different fields conducted with various groups. For example, in a study conducted by Mandler et al. (1987), participants were exposed to unmasked irregular geometric shapes for very short 1-2 ms periods, and it was shown that these participants produced preferences as well as familiarity for the shapes that had previously appeared. In another study, positive words starting with "i" shown as subliminal messages increased implicit confidence (Dijksterhuis, 2004). Furthermore, some subliminal stimuli are being used to increase the efficiency of therapeutic treatments such as smoking cessation, weight-loss, and increasing self-confidence (Silverman et al., 1978). On the other hand, it

was concluded that subliminal messages were not effective in changing attitudes, behaviors, motivation or complex behaviors (Moore, 1982; Zanot et al., 1983). In our research, the result that there was no difference in the anxiety, self-confidence, and general self-efficacy levels of the students in the experiment and control group might be related to the fact that the animated video on ventrogluteal IM injection practice skill training was comprehensible and didactic for both groups. It can be said that the results of our research support hypothesis H0.

In our research, it was observed that although not significantly, the ventrogluteal IM injection practice skill levels of the students in the experiment group were at an 'adequate' level at a higher rate than in the control group. Although there are no studies on the effects of subliminal messages on nursing students, there are some studies conducted on different students. In a study, before and after a 10-minute counseling session given with the regular law class each week, university students in the experiment group were exposed to visual subliminal messages saying "Mother and I are one" and "Professor and I are one," and students in the control group were exposed to a visual subliminal message saying "People are walking." It was concluded that the students in the experiment group received higher scores on the practice exam than those in the control group (Parker, 1982). It can be said that the method of watching videos with animated subliminal content in teaching ventrogluteal IM injection to the students positively affects the application skills of the students.

Perception is defined as the process of collecting, interpreting, selecting, and organizing sensory information. There is no distinct line between conscious and subconscious detection because perception differs from person to person and day

to day (Moore, 1982). Subliminal perception is explained as "any situation in which unnoticed stimuli are perceived" (Merikle ve Daneman, 2000). In our research, the ventrogluteal IM injection skill animated video that included subliminal messages was shown only once to the students in the experiment group and their anxiety, self-confidence, self-efficacy, and skill levels were measured according to the practice performed immediately after watching the video. The long-term effects of the subliminal messages could be observed by regularly showing the video to the students. This deficiency could be a limitation of our research. This result suggests that the H1 hypothesis could partly be accepted. In other words, it can be said that subliminal messages used in an animated video for ventrogluteal IM injection training did not affect students' state-trait anxiety, general self-efficacy, and self-confidence levels, but increased their ventrogluteal IM injection application skill levels.

Showing videos is a commonly used education method in nursing basic skill training (Akin Korhan ve Üstün, 2015; Cardoso et al., 2012) and it is reported that this method increases students' satisfaction (Gürol Aslan et al., 2018). Today, with the vastly improving technology, different methods for nursing basic skill training can be developed and the feasibility of these methods and their effects on students can be investigated. In this direction, we believe that our research is unique and can be a guide for other scientific studies.

### *Limitations*

The limitations of the research are conducting the research at a single center, not investigating the long-term effects of subliminal messages by showing the ventrogluteal IM injection training video to the students multiple times, and not

examining other factors that might have an effect on students' self-confidence, self-efficacy, anxiety, and skill levels.

### IMPLICATIONS FOR PRACTICE

As a result of our research, it can be said that educational videos containing positive subliminal messages can be used in nursing basic skills teaching. However, further studies are needed where such positive subliminal messages are used in nursing basic skills training. Long-term effects of visual positive subliminal messages used in ventrogluteal IM injection basic skills training video can be investigated by further studies. The usefulness of negative subliminal messages in nursing basic skills training can also be tested. New and effective teaching methods should be developed by considering the characteristics and requirements of new generations in nursing basic skills trainings.

Visual subliminal messages used in ventrogluteal intramuscular injection training could increase students' application skill levels. There is a need for other studies on this subject.

### Information

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