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Lines Before Anatomy: Drawing as a Tool to Reduce Death Anxiety and Prepare Students for Cadaver Encounters

Anatomi Öncesinde Çizgiler: Ölüm Kaygısını Azaltmak ve Öğrencileri Kadavra ile Karşılaşmaya Hazırlamak İçin Bir Araç

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Abstract

Objective: This study aims to examine the effect of drawing-based approaches applied before dental students' first encounter with cadavers on their perceptions of cadavers and levels of death anxiety. It is known that the first encounter with a cadaver generally triggers negative emotions such as anxiety, fear, and unease in students, as well as positive emotions such as respect, curiosity, and a sense of professional responsibility. In this context, the aim is to reveal the contribution of drawing, one of the art-based methods, to the students' emotional adjustment process.

Materials and methods: The study was conducted with a total of 31 dental students enrolled in the elective "Artistic Anatomy" course at our university who had never seen a cadaver before and volunteered to participate in the study. After administering the Thorson-Powell Death Anxiety Scale, the students were randomly divided into three groups. Students in the first group were shown the cadaver directly. Students in the second group were asked to imagine and draw the cadaver and then compare their drawings with the actual cadaver. Students in the third group were first shown a part of the cadaver, asked to draw that part, and then shown the entire cadaver. After these stages, all students were administered the Thorson-Powell Death Anxiety Scale and then a feedback questionnaire to assess their perceptions of the cadaver.

Results: When the pre-test and post-test scores of the death anxiety scale were compared, it was found that the post-test scores were significantly lower in all students ($p < 0.001$). In addition, the anxiety levels of the students who directly viewed

the cadaver (Group 1) were higher than those of the students who participated in the drawing activities (Groups 2 and 3) (p = 0.039 and p = 0.005, respectively), whereas no significant difference was observed between Groups 2 and 3 (p = 0.603). Furthermore, students who reported never having seen a deceased person before were found to have higher anxiety levels than the other students (p = 0.017).

Conclusion: The findings indicate that drawing-based practices are effective in reducing the anxiety and fear experienced by students prior to their first encounter with a cadaver. Drawing emerges as a tool that not only facilitates emotional adaptation but also supports professional awareness and a respect-based perspective. Therefore, it is recommended that drawing activities be incorporated into pedagogical planning, particularly to support anxiety management before the first encounter with a cadaver in anatomy education.

Özet

Amaç: Bu çalışma, diş hekimliği öğrencilerinin kadavra ile ilk karşılaşmaları öncesinde uygulanan çizim temelli yaklaşımların, öğrencilerin kadavra algıları ve ölüm kaygısı düzeyleri üzerindeki etkisini incelemeyi amaçlamaktadır. Kadavra ile ilk karşılaşmanın genellikle öğrencilerde kaygı, korku, huzursuzluk gibi olumsuz duyguların yanı sıra saygı, merak ve mesleki sorumluluk hissi gibi olumlu duyguları da tetiklediği bilinmektedir. Bu bağlamda, sanat temelli yöntemlerden biri olan çizimin öğrencilerin duygusal uyum sürecine katkısını ortaya koymak hedeflenmiştir.

Gereç ve Yöntem: Çalışma, üniversitemizde seçmeli "Artistik Anatomi" dersine kayıtlı, daha önce hiç kadavra görmemiş ve çalışmaya gönüllü olarak katılan toplam 31 diş hekimliği öğrencisi ile yürütülmüştür. Thorson-Powell Ölüm Kaygısı Ölçeği uygulandıktan sonra öğrenciler rastgele üç gruba ayrılmıştır. Birinci gruptaki öğrencilere doğrudan kadavra gösterilmiştir. İkinci gruptaki öğrencilerden kadavrayı hayal edip çizmeleri ve ardından çizimlerini gerçek kadavra ile karşılaştırmaları istenmiştir. Üçüncü gruptaki öğrencilere ise önce kadavranın bir bölümü gösterilmiş, bu kısmı çizmeleri istenmiş, ardından tüm kadavra gösterilmiştir. Bu aşamalardan sonra, tüm öğrencilere Thorson-Powell Ölüm Kaygısı Ölçeği ve ardından kadavraya yönelik algılarını değerlendirmek üzere geri bildirim anketi uygulanmıştır.

Bulgular: Ölüm kaygısı ölçeğinin ön test–son test sonuçları karşılaştırıldığında, tüm öğrencilerde son test puanlarının anlamlı derecede daha düşük olduğu saptanmıştır (p<0,001). Ayrıca, doğrudan kadavrayı gören 1. Grup öğrencilerinin kaygı düzeyleri, çizim yapan 2. ve 3. gruplara kıyasla daha yüksek bulunmuştur (sırasıyla p=0,039 ve p=0,005), ancak 2. ve 3. grup arasında anlamlı fark görülmemiştir (p=0,603). Bununla birlikte, daha önce hiç ölü bir insan görmediğini belirten öğrencilerin kaygı düzeylerinin diğer öğrencilere göre daha yüksek olduğu görülmüştür (p=0,017).

Sonuç: Bulgular, çizim temelli uygulamaların öğrencilerin kadavra ile ilk karşılaşma öncesinde yaşadıkları kaygı ve korkuyu azaltmada etkili olduğunu göstermektedir. Çizim, hem duygusal adaptasyonu kolaylaştırıcı hem de mesleki farkındalığı ve saygı temelli bakış açısını destekleyici bir araç olarak öne çıkmaktadır. Bu nedenle, özellikle anatomi eğitiminde kadavra ile ilk karşılaşma öncesi kaygı yönetimini desteklemek amacıyla çizim uygulamalarının pedagojik planlamaya dâhil edilmesi önerilmektedir.

Introduction

The first encounter with a cadaver can cause intense and complex emotional reactions in students (1,2). Some students describe this encounter as a "shock" (3), and this experience can trigger negative emotions such as confusion, fear, anxiety, guilt, discomfort, and even trauma in students (1–3); it can also evoke positive emotions such as respect, gratitude, admiration, and professional responsibility (3–5). Although it is known that the process of adapting to the dissection environment can vary among individuals and that these emotional responses may diminish over time (5–7), it has been emphasized that the emotional burden experienced during the first encounter is strong enough to affect the educational process (8). It has been reported that students experience both psychological and physiological responses during their first experiences, and that in some students, this process can manifest itself through somatic effects such as anxiety, nausea, dizziness,

sweating, fainting, and low blood pressure (8).

The negative emotions students experience when faced with a cadaver are generally rooted in the fact that this is their first direct encounter with death. The reality that a cadaver is a human body is perceived by many students as a concrete representation of death, which can trigger individual anxiety about death (1,9). The dissection experience is not only academic but also existential in nature, revealing students' individual attitudes toward death and dying (4,6). It has been reported that death anxiety is influenced by numerous variables, including an individual's past experiences, cultural factors, religious beliefs, and previous experiences with death (2,4,7,8). Many students perceive the dissection environment as an uncontrolled source of stress, triggering coping mechanisms related to death (8). Therefore, these reactions may stem not only from the nature of the experience but also from the student's mental and emotional preparedness regarding the concept of death.

Various methods are suggested in the literature to reduce the negative reactions that arise upon first encountering a cadaver. The foremost of these methods is to provide students with psychological preparation prior to dissection. In particular, providing students with prior information about the identity of the cadaver, the donation process, and the ethical dimensions can support their search for meaning and alleviate the emotional burden (1,7,10,11). Memorial ceremonies have been noted to help students develop gratitude and respect for donors while also serving to alleviate the emotional weight of the theme of death (4,5). Some studies have shown that structured preparatory sessions and reflective/narrative-based approaches (e.g., writing activities, group discussions) prior to dissection facilitate students' expression of emotions, thereby reducing the psychological burden that encountering a dead body may create (6,7,11). Although these methods are reported to have mostly positive effects, some studies (2,6,11) emphasize that these effects are not applicable to all students and that individual differences must be taken into account.

In recent years, numerous studies have shown that various artistic practices such as drawing, collage, painting, sculpture, creative writing (poetry writing and short story creation, etc.), and illustration have been incorporated into the process of encountering cadavers (4,8,9,12–14). These practices are reported to facilitate students' emotional adaptation to cadavers and help them make sense of confronting death (9,12,14). Additionally, it has been noted that these practices help students develop empathy and sensitivity toward cadavers (4,13), foster an ethical perspective (12), and support interdisciplinary thinking skills (4). Among these artistic practices, drawing stands out as a versatile tool that supports both the process of coping with emotions and cognitive development, such as anatomical understanding and visual analysis skills, due to its individual and accessible structure (observational or imagination-based) (6,8,12).

All these findings point to the potential benefits of various activities and artistic approaches in supporting students' emotional and cognitive processes during their first encounter with cadavers. In the current literature, studies that examine the effects of drawing experience on these processes, particularly in terms of different strategies such as observation-based and imagination-based drawing, are limited in the experimental realm. In this context, this research aims to contribute meaningfully to the literature at the intersection of art and anatomy education by examining the effects of drawing-based applications on students' perception of cadavers and death anxiety.

Method

This study was approved by the Istanbul Yeni Yuzyil University Ethics Committee for Research in Science, Social and Non-Interventional Health Sciences (IRB: 2024/03-1228). Out of a total of 45 dental students enrolled in the elective course "Artistic Anatomy" at our university, 31 students who had never seen a cadaver before and voluntarily agreed to participate in the study were included in the research. The students were provided with detailed information about the study, and it was emphasized that the study was not graded. The students who agreed to participate signed an informed consent form, and the "Thorson-Powell Death Anxiety Scale" was administered as a pre-test.

The students were then randomly divided into three groups. The students in the first group were shown the cadaver directly. The students in the second group were asked to imagine the cadaver and draw what they imagined; after the drawing process,

they were allowed to compare their drawings with the actual cadaver. To do this, the students in the second group were instructed to mentally visualize the human body before seeing the cadaver. They were given the following instructions: “Close your eyes and imagine a cadaver. Think of the human body as a whole. Now try to draw the image that comes to mind, conveying as many details as you can.” No visual material or cadaver images were shown during the drawing process. Students in the third group were shown only a specific area of the cadaver in the first stage and asked to draw that area, after which the entire cadaver was shown to them. Both the second and third groups were given 30 minutes to complete their drawings. Following the application, a feedback survey and the “Thorson-Powell Death Anxiety Scale” were administered to all three groups. While completing the Death Anxiety Scale and Feedback Survey, students were asked to choose a nickname for themselves and complete the scales using this nickname.

Assessment Methods

Thorson-Powell Death Anxiety Scale

The Thorson Powel Death Anxiety Scale is a 25-question 5-point Likert scale (0: Strongly agree, 4: Strongly disagree). Scores range from 0 to 100, with higher scores indicating higher levels of death anxiety (items 4, 10, 11, 13, 17, 21, 23, and 25 are reverse-scored) (15). In this study, pre- and post-intervention scores from this scale will be compared to examine death anxiety levels and changes. The Turkish adaptation of the Thorson–Powell Death Anxiety Scale was performed by Karaca and Yıldız (15) and the internal consistency of this scale was found to be Cronbach’s α = 0.84, indicating high reliability.

Feedback Survey

The feedback survey developed by researchers for this study was designed to evaluate students’ perceptions of cadavers, emotional responses, and drawing experiences. The survey consists of 4 sections and 20 questions. The first section of the survey includes 3 questions asking for students’ pseudonyms, age, gender, and the department/class they are enrolled in. The second section contains a total of 12 statements regarding students’ perceptions of cadavers, 1 of which is in a yes/no format and 11 of which are in a 5-point Likert scale format. In the third section, only the groups that drew (Group 2 and Group 3) were asked to respond to four 5-point Likert-type statements regarding the effect of the drawing experience on their perception of cadavers. The Likert-type items were rated on a scale of 1 = “Strongly disagree” to 5 = “Strongly agree”, and quantitative analysis was performed based on these ratings. In the final section, an open-ended question was asked, requesting participants to write about their feelings, thoughts, and personal experiences regarding the study. This question was evaluated using thematic analysis. The internal consistency of the questionnaire was calculated as Cronbach’s α = 0.72, and its reliability was found to be acceptable.

Statistical analysis

Since the study population was limited to 45 individuals, priori power analysis using G*Power 3.1 determined that a minimum sample size of 30 was required to achieve 80% power.

The Shapiro-Wilk test was used to assess the normality of the variables. Continuous variables were presented as mean ± standard deviation, and categorical variables were reported as n (%). Based on the results of the normality test, paired samples t-test was used for comparisons between two dependent variables, while independent samples t-test was applied for comparisons between two independent groups. When the number of groups exceeded two, one-way ANOVA was used. In the presence of significant differences, Dunn-Bonferroni post hoc tests were conducted to determine which group or groups caused the difference. For non-normally distributed variables, the Kruskal-Wallis H test was applied to compare more than two independent groups, and the Mann-Whitney U test was used for comparisons between two independent groups. The relationship between the scores obtained from the feedback questionnaire and the Thorson-Powell Death Anxiety Scale (pre-test, post-test, and difference scores) was evaluated using the Spearman correlation analysis. The reliability of the scales was assessed using Cronbach’s alpha coefficient. Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 21.0 (IBM Corp., Armonk, NY), and a p-value < 0.05 was considered statistically significant.

Thematic analysis, as defined by Braun and Clarke

(16), was conducted for the qualitative analysis of responses to open-ended questions in the feedback survey. This analysis was carried out in six stages: familiarization with the data, initial coding, theme generation, theme review, theme definition and naming, and report writing (16). In this context, student statements were first read in detail, and initial codes were created by recording repetitive or noteworthy statements. Subsequently, these codes were grouped based on similarity and content proximity to develop subthemes. The coding and theme development process was conducted independently by two researchers. After this stage, the obtained themes were reviewed again by two researchers, and the main themes were finally established.

Results

A total of 31 students participated in the study. Nineteen of them were female (61.29%) and 12 were male (38.71%). The average age was 19.6±1.1. All of the students were first-year dental students. Group 1 consisted of 10 (32.3%), Group 2 consisted of 11 (35.4%), and Group 3 consisted of 10 (32.3%) individuals. No significant differences were observed between the three groups in terms of gender and age ($p>0.05$).

Thorson–Powell Death Anxiety Scale

A significant decrease in mean scores was observed when comparing the Thorson–Powell Death Anxiety Scale scores of all participants before and after the intervention (pre-test: 52.58±5.68, post-test: 47.19±5.57; $p<0.001$).

There was no significant difference in mean total pre-test scores between the three groups ($p>0.05$). However, it was determined that the total post-test scores obtained after the study differed between the groups ($p=0.003$). Accordingly, it was determined that the average scores of the students in Group 1 were higher than those of the students in Groups 2 and 3 ($p=0.047$ and $p=0.002$, respectively). It was determined that there was no difference in the total test scores obtained after the training for students in Groups 2 and 3 ($p=0.603$). Additionally, the analysis of the scale based on questions between groups is presented in Table-1.

Feedback Survey

Following the demographic questions asked in the first section of the survey, 12 participants (38.71%) answered “yes” to the question “Have you ever seen a dead person?” while 19 participants (61.29%) answered “no.” It was found that students who had never seen a deceased person had higher TP death anxiety scale scores ($p=0.017$).

In the analyses of the first 11 items evaluating students’ perceptions of cadavers and their emotional responses when seeing cadavers, no statistically significant difference was found between the three groups ($p>0.05$) (Table-2). Similarly, no difference was observed between Group 2 and Group 3 in their responses to questions 12–15, which assessed their opinions on drawing experiences ($p>0.05$).

Although there was no statistical difference, Group 1 students had higher average scores than the others on questions containing negative statements about cadavers and death (questions 1, 2, 3, and 8). On the other hand, Group 2 and 3 students had higher averages than Group 1 on questions containing positive statements such as empathy and respect for cadavers (questions 9 and 10). Group 2 and 3 students had higher average scores than Group 1.

Furthermore, no statistically significant relationship was found between the scores given to the statements in the feedback survey and the pre-test and post-test scores of the Thorson-Powell Death Anxiety Scale, as well as the difference scores between them, in analyses conducted at both the general level and the group and statement levels ($p>0.05$). This indicates that students’ attitudes toward cadavers do not directly reflect changes in death anxiety.

Thematic Analysis

Figure Legends

Figure-1: Thematic analysis

The inner circle shows the main themes, the middle circle shows the subthemes, and the outer circle shows the codes.

Table 1: Thorson-Powell Death Anxiety Scale results

Thorson-Powell Death Anxiety Scale	Group 1		Group 2		Group 3		p-value	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
I fear dying a painful death.	6±1.3	10±1.6	4±0.5	5±0.7	13±1.3	9±1.2	0.430	0.376
Not knowing what the next world is like troubles me.	17±1.6	17±1.8	17±1.5	21±1.4	15±1.4	19±1.4	0.950	0.808
The idea of never thinking again after I die frightens me.	23±1.1	28±1.3	24±1.4	22±1.4	16±1.2	22±1.3	0.713	0.223
I am not at all anxious about what happens to the body after burial.	18±1.6	29±1.7	23±1.5	18±1.2	13±1.3	13±1.6	0.589	0.812
Coffins make me anxious.	21±1.7	21±1.7	17±1.4	20±1.3	18±1.5	20±1.3	0.703	0.084
I hate to think about losing control over my affairs after I am gone.	36±0.7	25±1.5	28±1.4	25±1.6	19±1.7	19±1.3	0.825	0.055
Being totally immobile after death bothers me.	32±1.1	23±1.4	25±1.4	16±1.1	26±1.6	25±1.6	0.775	0.283
I dread to think about having an operation.	15±1.4	14±1.3	24±1.1	22±1.1	23±1.3	19±1.5	0.611	0.342
The subject of life after death troubles me greatly.	20±1.2	17±1.6	18±1.1	17±1.2	20±1.6	20±0.9	0.906	0.761
I am not afraid of a long, slow dying.	24±1.6	23±1.7	26±1.6	26±1.6	25±1.3	18±1.8	0.644	0.812
I do not mind the idea of being shut into a coffin when I die.	18±1.3	18±1.5	17±1.6	28±0.9	17±1.8	10±1.1	0.298	0.881
I hate the idea that I will be helpless after I die.	29±1.1	25±1.5	21±1.6	20±1.0	20±1.6	22±1.5	0.682	0.105
I am not at all concerned over whether or not there is an afterlife.	31±1.3	30±1.2	28±1.8	31±1.3	21±1.7	23±1.2	0.551	0.704
Never feeling anything again after I die upsets me.	25±1.2	24±1.6	20±1.4	20±1.3	22±1.5	21±1.5	0.471	0.854
The pain involved in dying frightens me.	9±1.4	12±1.6	13±1.5	12±0.8	14±1.1	8±1.0	0.558	**0.041**
I am looking forward to new life after I die.	19±1.6	13±1.1	19±1.3	16±1.2	7±0.9	9±1.0	0.714	0.335
I am not worried about ever being helpless.	27±1.1	26±1.3	25±1.1	22±1.1	23±1.3	14±1.2	0.074	0.386
I am troubled by the thought that my body will decompose in the grave.	22±1.4	20±1.6	26±1.1	18±1.2	27±1.5	25±1.3	0.707	0.383
The feeling that I will be missing out on so much after I die disturbs me.	28±1.2	27±1.1	21±1.4	20±1.7	19±1.7	23±1.3	0.999	**0.016**
I am worried about what happens to us after we die.	22±1.6	18±1.5	26±1.3	19±1.4	12±1.2	21±1.1	0.700	0.189
I am not at all concerned with being in control of things.	13±1.6	17±1.3	15±1.2	16±1.0	23±1.3	18±1.3	0.936	0.518
The total isolation of death is frightening to me.	20±1.4	24±1.3	16±1.6	19±1.3	15±1.1	19±1.2	0.619	0.294
I am not particularly afraid of getting cancer.	28±1	25±1.4	25±1.6	25±1.6	25±1.5	17±1.5	0.534	0.297
I will leave careful instructions about how things should be done after I am gone.	20±1.6	21±1.6	17±0.8	15±0.9	17±1.4	15±1.4	0.722	0.474
What happens to my body after I die does not bother me.	35±1	33±1.3	24±1.7	27±1.7	17±1.3	18±1.4	0.547	0.729

Table 2: The results of the 2nd and 3rd sections of the feedback survey

	Group 1	Group 2	Group 3	p-value
The word “cadaver” scares me.	1.9±1.2	1.8±0.4	1.4±1.0	0.061[a]
The idea of seeing a dead person scares me.	2.9±1.5	2.2±1.1	1.7±0.9	0.136[a]
I am afraid to visit graveyards.	2.6±1.3	1.6±1.0	2.5±1.6	0.156[a]
Cadavers are sacred beings because they are used for educational purposes.	4.1±1.0	4.2±1.1	4.2±1.4	0.952[a]
The cadaver must be viewed and accepted as an object.	4.2±0.8	3.7±1.2	2.7±1.4	0.057[a]
I felt fear/anxiety before entering the dissection room.	2.5±1.4	2.9±1.1	2.5±1.6	0.659[a]
Emotions should be left behind when entering the anatomy laboratory, and a realistic approach should be taken.	4.2±1.2	4.3±0.8	4.2±1.3	0.914[a]
I had concerns about touching the cadaver.	2.6±1.5	2.5±1.1	1.8±0.9	0.284[a]
I empathized with the cadaver.	3±1.2	3.5±1.1	3.5±1.4	0.556[a]
This study increased my respect for cadavers.	3.8±1.5	4.5±0.5	4.4±1.0	0.574[a]
I donate my body to medical science as a cadaver.	2.2±1.4	2.3±0.9	3.2±1.5	0.197[a]
Drawing before seeing the cadaver reduced my fear. *	-	2.8±1.1	2.5±1.2	0.551[b]
Drawing before seeing the cadaver in the anatomy lab gave me time to reflect on my feelings about death, dying, and dissection.*	-	2.7±1.2	3.1±1.3	0.452[b]
By drawing, I felt emotionally prepared to see the cadaver.*	-	3.2±1.4	3.4±1.2	0.878[b]
After drawing within the scope of art and anatomy, examining the cadaver contributes positively to students' meticulous thinking and imagination skills.*	-	3.6±1.4	4.4±0.5	0.228[b]

a: Kruskal-Wallis test, b: Mann-Whitney U test

*These statements, which belong to the third section of the feedback survey, relate to drawing and therefore only the groups that drew (Groups 2 and 3) answered these questions.

The three main themes and six sub-themes associated with them are presented in Figure 1. The first theme examined students' emotional responses when they first encountered a cadaver. Some participants reported experiencing negative emotions such as anxiety, strangeness, fear, and discomfort associated with thoughts of death at the outset: "My heart was racing as I entered the cadaver room; I was anxious and I think I was scared" [S31]. On the other hand, many students reported that they did not find the cadaver experience as frightening as they had anticipated, and even experienced positive emotions such as excitement, happiness, and emotionality. For example, "I wasn't afraid at first; I was excited. The reason I wasn't afraid was out of respect for the cadaver" [S10].

The second theme focused on students' professional awareness and ethical transformation process. Participants described the cadaver not merely as a learning material but as a sacred entity that had served science: "I found it very sacred that people donated their bodies after death" [S16]. They also mentioned their respect for the cadaver, their consideration of donating their bodies in the future, and how this experience encouraged them to view the human body differently: "I thought I would be afraid of the cadaver, but I empathized with it and my respect grew so much that... I might consider donating my body in the future. It wasn't what I expected at all; I'm glad I participated in the study and had enough time to draw it" [S28]. They also stated that this process increased their interest in their profession and supported their professional identity development: "This was my first time participating in such a study, and my curiosity about science has increased. Now I am more enthusiastic and eager about my profession and science." [S3]. "I feel like I have taken a step forward in my profession" [S25].

Finally, the cognitive and emotional effects of the drawing process came to the fore. Students stated that during the drawing process, they not only made visual observations, but also thought, developed empathy, and became emotionally involved in the process. Many mentioned that drawing gave them the opportunity to think about and examine the cadaver in detail: "I think drawing one part of the cadaver led me to examine the other parts in detail. I didn't just look at the body blankly and move on; I tried to engrave every detail in my mind, just like when I was drawing the same foot" [S30]. Regarding the process of drawing and their first encounter with the cadaver, they said: "At first, I couldn't look directly at the body, but while drawing, I felt as if there was a curtain between me and the cadaver" [S27], "My hands and mind were focused on the drawing. This way, even though the cadaver affected me deeply, I forgot that it was a real human body while drawing, and I didn't pay attention to its coldness and stiffness." [S24]. Additionally, experiences related to drawing were largely evaluated positively; codes such as "beautiful experience," "drawing is useful" and "memorable lessons" supported this orientation. Furthermore, the majority of participants evaluated drawing as a positive experience and an effective learning tool (Figure-1): "Drawing on the cadaver was an exciting and educational experience for me." [S26]

Discussion

This study aimed to examine the effects of different drawing-based strategies applied before the first encounter with a cadaver on students' perception of cadavers and death anxiety. According to the quantitative findings, a significant decrease in death anxiety levels was observed in all participants. However, the decrease in death anxiety was more pronounced in the groups that participated in the drawing activity compared to the group that directly encountered the cadaver. Data from the feedback survey indicate that drawing-based preparation had a positive effect on students' emotional responses to the cadaver. Furthermore, the results of the qualitative analysis revealed that the drawing process contributed not only emotionally but also in terms of professional awareness, ethical sensitivity, and cognitive depth. These findings suggest that drawing, one of the art-based learning approaches, can play a constructive role in experiences involving intense emotional stimuli, such as encountering a cadaver and death anxiety.

Students described the drawing activity they performed on cadavers not only as a technical endeavor but also as an active strategy that transformed their learning processes. Participants noted that their attention increased significantly during the drawing process, they examined structures in greater detail, and this process made the information more memorable. These findings are consistent with the existing literature.

Drawing has been shown to improve students' conceptual structuring skills and increase their motivation to learn (17,18). In addition, it has been reported that students who draw perform better on tests and remember structural details better (19,20). Drawing has also been shown to increase attention and focus (21), support long-term memory (22), and enhance conceptual understanding by facilitating visualization (23). Students perceive drawing as both an enjoyable and educational method (24). All these findings reveal that drawing is not merely a visual representation tool but also a multidimensional pedagogical tool that supports attention, comprehension, memory, and intrinsic motivation for learning. In this context, the experience students have with the drawing process can be considered a structured, active form of learning through the reproduction, appropriation, and interpretation of knowledge.

The first encounter with a cadaver is a powerful and emotionally complex experience for many students. Although the feedback survey results did not show statistically significant differences between groups, they did reveal noteworthy trends. The fact that Group 1 scored higher on items reflecting negative emotions, while Groups 2 and 3 scored higher on items reflecting positive attitudes such as empathy and respect, suggests that drawing-based preparation may positively influence students' perception of cadavers. Additionally, Group 3 having the lowest average on the item "The cadaver should be viewed as an object" suggests that students in this group evaluated the body more in a human and ethical context. Items related to drawing revealed that students felt this practice prepared them emotionally and contributed to their thinking and imagination skills. These trends are consistent with studies in the literature reporting that art-based practices strengthen empathy and facilitate emotional adaptation in the presence of cadavers (4,12). Our thematic analysis results show that emotions such as anxiety, fear, and unease are particularly intense during the initial contact, but these effects diminish over time. The support provided by the drawing application in managing this emotional process is noteworthy. Participants' statements indicate that while drawing, emotions can be temporarily pushed into the background, allowing students to focus their attention on objective details and thereby experience a more balanced internal experience. Drawing creates a kind of "visual touch" area that replaces direct contact with the body, allowing students to adjust both their physical and emotional distance (4,11). In this way, it serves not only as a means of visualization but also as a tool for internal regulation. On the other hand, one of the fundamental components of the emotional burden experienced during the first encounter with a cadaver is the students' direct confrontation with death. The cadaver is perceived by many students as a concrete representation of death, and this situation can create intense anxiety about death at the individual level (4,8). In this process, drawing helps reduce the intensity of emotional stimuli by directing the student's attention to anatomical structures and facilitates the establishment of a more manageable relationship with the body by distancing the student from thoughts of death (2). Indeed, the quantitative findings obtained in this study also indicate that death anxiety is more pronounced in groups where drawing exercises were conducted. In addition, some students have stated that they were able to establish slower and more careful contact with the cadaver during drawing, transfer their emotions to the lines, and notice the stiffness or coldness of the body less during this process. In drawing-based activities conducted in art-anatomy workshops, it has been noted that students' understanding of the cadaver as a "body" occurs in a more natural and gradual manner, that drawing can reduce anxiety by keeping the hands occupied, and that it provides a mental buffer zone (13,25,26). In this context, drawing can be seen as a multidimensional tool that not only supports the learning process but also alleviates death anxiety and helps students make their experience more manageable.

In the present study, dental students stated that drawing experience affected their personal and professional awareness; they developed a more careful, attentive, and respectful approach to cadavers/human bodies, and this process strengthened their sense of professional responsibility and helped them view their profession from a more meaningful perspective. These findings are consistent with the literature highlighting the supportive role of art-based practices in professional identity development. Drawing activities have been reported to reinforce values such as empathy, ethical sensitivity, and respect for humanity in students (8,11). Furthermore, drawing

has been found to slow down the way students relate to cadavers, thereby facilitating emotional bonding (4), and the relationship established with the body has been described as acquiring not only academic but also moral and aesthetic dimensions (2). Studies conducted with students in the fields of medicine (4,18,25), physical therapy (23), veterinary medicine (8), and art (24,26) have also shown that drawing-supported learning experiences have positive effects not only on cognitive and emotional gains but also on professional ethical and identity development. In this context, drawing-based applications add ethical, aesthetic, and emotional layers to the cadaver-based learning process.

The current literature shows that drawing-based applications are implemented using different strategies. These strategies differ in terms of cognitive-emotional outcomes. Observation-based drawing encourages students to carefully examine objective details (11,20), while imagination-based drawing supports active recall by engaging prior knowledge and mental representation (23,24). Progressive drawing reduces cognitive load by constructing anatomical structures step by step (27), while the haptic-drawing combination strengthens three-dimensional understanding by combining touch and visual representation (11). Screencast methods, on the other hand, allow students to work at their own pace and repeat tasks (17,18). While these differences are notable, no study has been found that compares different drawing strategies or demonstrates the superiority of one method over another. Our findings show that observational drawing and imagination-based drawing methods are effective in reducing death anxiety compared to students who encounter cadavers directly. However, there was no difference between the two drawing groups in terms of students' death anxiety or cadaver perceptions. Nevertheless, experimental studies are needed to investigate the effects of different drawing methods on students' cognitive-emotional outcomes related to anatomy.

Strengths and Limitations

This study contributes to the literature by examining the effects of art-based approaches on cadaver experience, specifically among dental students. Unlike previous studies, which were mostly conducted with medical students, this study examines in detail the cognitive, emotional, and ethical relationship that dental students establish with cadavers through drawing. The finding that drawing can contribute to values such as professional identity development and respect for humanity highlights the pedagogical as well as professional aspects of art-based practices. However, some limitations of the study should be considered. First, the research was conducted exclusively with dental students, which restricts the generalizability of the findings to other student populations. In addition, the students who participated in the study were individuals who voluntarily enrolled in an elective course called "Artistic Anatomy." In this case, the participants may be individuals who are more interested in art or more open to drawing activities, and/or may have different personality traits, interests, or perceptions. However, since the study focused on the students' emotional/reactive outputs during and after the drawing process, drawing ability or quality was not a determining factor. Nevertheless, the fact that the study was conducted at a single institution, in a single faculty, and with students from a single semester limits the external validity (generalizability) of the results. As a result, the drawing-based learning experience may not always be equally meaningful or effective for every student, and may limit the generalizability of the findings. In this context, the results obtained may need to be reevaluated in different student profiles, different teaching environments, or different educational levels.

Conclusion

This study revealed that observation-based and imagination-based drawing strategies applied prior to the first encounter with a cadaver are effective in reducing death anxiety and positively shaping the perception of cadavers. Both methods resulted in lower anxiety levels compared to students who had direct contact with cadavers and contributed to the development of professional awareness, ethical sensitivity, and anatomical observation skills. The findings indicate that drawing-based applications in anatomy education support not only cognitive learning but also emotional adaptation and the internalization of professional values. Therefore, the planned integration of drawing-based applications into anatomy education programs prior to the first encounter with a cadaver has the

potential to facilitate students' adaptation to the learning process, balance their anxiety levels, and strengthen their ethical awareness.

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