

EXPLORING FACTORS INFLUENCING DENTAL STUDENTS' NEGATIVE EMOTIONS DURING A GROSS ANATOMY LABORATORY IN EGYPT

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ABSTRACT

Background/purpose: Negative emotions of medical students during a gross anatomy laboratory are documented in the field of medical education, but those of dental students are relatively less reported in the literature. The purpose of the present study was to explore negative emotions of dental students during the gross anatomy laboratory and possible influential factors. **Materials and methods:** Basic demographic variables, gross anatomy learning attitudes, and/or life attitudes were collected at five time points among year 2 dental students (n = 49) at a medical university in northern Egypt. Multi-hierarchical regression analyses were executed to explore possible factors that led to negative emotions.

Results: Students who were older, had more-positive attitudes towards life, and had more positive attitudes towards the anatomy laboratory tended to have weaker negative emotions when they first faced the cadavers. Having a tendency to care about and help people and having a grateful attitude also significantly predicted weaker negative emotions at the middle and end of the semester, respectively.

Conclusion: Negative emotions of younger dental students who first encounter a cadaver should be of concern. Striving to improve students' positive attitudes toward life, positive attitudes

toward the gross anatomy laboratory, willingness to care about and help people, and an overall grateful attitude may help reduce negative emotions during the gross anatomy laboratory. At an institutional level, integrating educational activities that reduce negative emotions toward cadavers by dental students is highly recommended

INTRODUCTION

The gross anatomy laboratory is a heavy workload course for both medical and dental students during their preclinical stage. On the one hand, it constitutes common ground through which basic sciences, such as physiology, pathology, biochemistry, and pharmacology, can be 'integrated' into practical, operative, and laboratory-based cadaveric dissections.^{1e3} Since the late 1990s, the so-called 'integrated curriculum' that serves as a crucial linkage between basic medical sciences and clinical medicine highly relies on the learning efficacy of gross anatomy.

On the other hand, both medical and dental students possibly view gross anatomy with a kind of deep frustration coming from either the heavy load in memorizing terminologies and practicing skills or the multiple psychological symptoms from their first-time to see a cadaver up close.^{4e6} Regardless of the learning involved, merely surviving and passing this course is an important milestone for students. Therefore, gross anatomy is often said to be a "rite of passage" in the culture of health professionals: experiencing and completing this course implies a stage of maturity on the path to a medical profession.^{7e9} Even if they share common viewpoints on the gross anatomy laboratory, dental students, however, have distinct concerns that differ from those of medical students.¹⁰ For example, the highly debated issue of 'clinical relevance' in recent years, which problematizes the importance of covering regions of

the body below the neck, mitigates dental students' commitment to gross anatomy in their professional development.^{10e13} Carrying a prospective presumption that learning gross anatomy might not comprehensively equip them with competency in oral health, dental students may face this course with less emotional support from their professional commitment. In Egypt, the curriculum design in dental schools did not consider the 'clinical relevance' issue for many years, and dental students received the same gross anatomy course as did medical students. Although dental students might question the necessity of learning about regions other than the head and neck, they were left to develop their own coping strategies during the entire process of cadaver dissection. However, some Egyptese medical and dental schools conduct humanistic learning activities along with the gross anatomy course, such as visiting donor family members and holding an initiation ceremony, in order to facilitate both medical and dental students to learn about compassion or empathy from their 'silent mentor'.^{14e16} In this situation, dental students' emotional reactions when they encounter a cadaver for the whole semester become an urgent issue for both educators and researchers. Although medical students' negative emotions during the gross anatomy laboratory have been noted in medical education research,^{6,17e20} dental students' emotional reactions are relatively less reported in the literature. Thus, this study aimed to explore negative emotions of dental students during the gross anatomy laboratory and possible influential factors. Borrowing from scholarship on medical students, the factors come from three distinct sources: demographic characteristics, anxiety about academic performance, and interactions among different emotions.^{17e24} We were interested in such aspects as the variety of negative emotions with different genders, ages, religions, family closeness, physical-mental wellness, and impacts of learning and life attitudes. As exploratory research on dental students' negative emotions, we tried to include these three kinds of possible factors.

MATERIALS AND METHODS

Participants

In a medical university in northern Egypt, 23 male and 26 female students ($n = 49$) dental students in their second year volunteered to participate in the present study. They were aged 18e29 (20.69 ± 2.73) years, and all of them completely fulfilled the five-wave data collection. In total, 26 (53.1%) participants had religious beliefs, and their self-perceived physical and mental condition and relationship with their family on a 5-point Likert-type scale were 4.19 ± 0.73 and 4.41 ± 0.67 , respectively.

Measures

Self-perceived physical and mental condition and relationship with family In order to exclude influences from students' self-perceived physical and mental condition and relationship with their family, we asked participants to report their self-perceived physical and mental conditions, and their relationships with their family, ranging from 1 (very bad) to 5 (very good).

Life attitude inventory (LAI)

The LAI evaluates expectations, attitudes, and actions toward death, perceptions of interactions with others, actions, and the extent to which they affirm the meaning and value of their existence.²⁵ The 70-item scale is scored on a 7-point Likert-type scale (1: totally disagree to 7: totally agree), with a higher score indicating a more-mature attitude toward life. Two subscales, "love and care" and "feeling of existence", were adopted in this study. According to exploratory factor analyses based on previous data, we found that neither of these subscales was unidimensional, with the former being

further divided into “non-selfish” and “caring and helping”, and the latter being divided into “death acceptance” and “positive life”. The “non-selfish”

subscale consisted of five items that assessed mature interpersonal attitudes toward other people, e.g., “Honestly, I don’t care about anyone. (-)” The “caring and helping” subscale consisted of eight items that assessed positive interpersonal attitudes towards caring about or helping others, e.g., “I am willing to spend time accompanying people who need comfort”. The “death acceptance” subscale consisted of five items that assessed the extent to which an individual accepts death in his or her life, e.g., “One day my relatives and friends will die, and I will accept it peacefully without fear at that time”. The “positive life” subscale consisted of four items that assessed the extent to which an individual recognizes the meaning and value of his or her existence, e.g., “At the end of life, I hope I can tell myself that I am satisfied with my life and have no regrets”. Cronbach’s α values of the four new subscales were 0.83, 0.87, 0.74, and 0.73, respectively

Emotional reactions towards cadavers scale (ERTCS)

Based on students’ descriptions after the first time they saw a cadaver and the emotional reactions observed by educators of the gross anatomy laboratory, a 23-item scale was developed to measure students’ emotional reactions after they see a cadaver. Items of the ERTCS were rated from 1 (strongly disagree) to 7 (strongly agree) on a Likert-type scale. A pilot study showed that the validity and reliability of ERCTS were both satisfactory.⁶

Inventory of Undergraduates’ gratitude (IUG)

Based on the expectation of understanding the status of gratitude of college students in Egypt, the IUG was developed. It has a total of 26 items, is assessed on a Likert-type scale ranging from 1 (never) to 6 (always), and contains five subscales: 1) thank others, 2) thank God, 3) cherish what you have, 4) appreciate the hardship, and 5) appreciate the moment. The cumulative explained variance of the five factors was 50.18%, and the test results of overall fitness, internal structure fitness, and criterion-related validity showed that the scale had reasonable fitness and good criterion-related validity. In addition, Cronbach’s α of the total scale was 0.93, which was satisfactory as well.²⁶

Learning effectiveness of the gross anatomy laboratory scale (LEGALS)

To evaluate students’ overall learning expectation or effectiveness, the LEGALS measures the extent to which students become appreciative, cherishing, compassionate, aware of life and death, and willing to do their best to learn when taking the gross anatomy laboratory course (e.g., “This course makes me have more medical humanity virtue”). Based on students’ descriptions after visiting the family of a donated cadaver and observations from faculty members, 13 items were listed. The LEGALS is rated on a 7-point Likert-type scale (1: strongly disagree to 7: strongly agree) with a satisfactory Cronbach’s α of 0.96. A higher score represents a better outcome.⁹

PROCEDURES

Participants filled out a battery of questionnaires including the LAI, LEGALS, IUG, self-perceived physical and mental conditions, and relationship with their family before

the silent mentor’s family interview (T1), and they filled out the LAI (T2) after the family interview. In the beginning of their second year in the school of dentistry, participants filled out the ERTCS before they saw the ‘silent mentor’ (T3) and after the mid-term (T4). To evaluate changes at the end of the semester, they filled out the LAI, LEGALS, IUG, and ERTCS at the end of the semester (T5). A timeline of the five-wave data collection is shown in Fig. 1

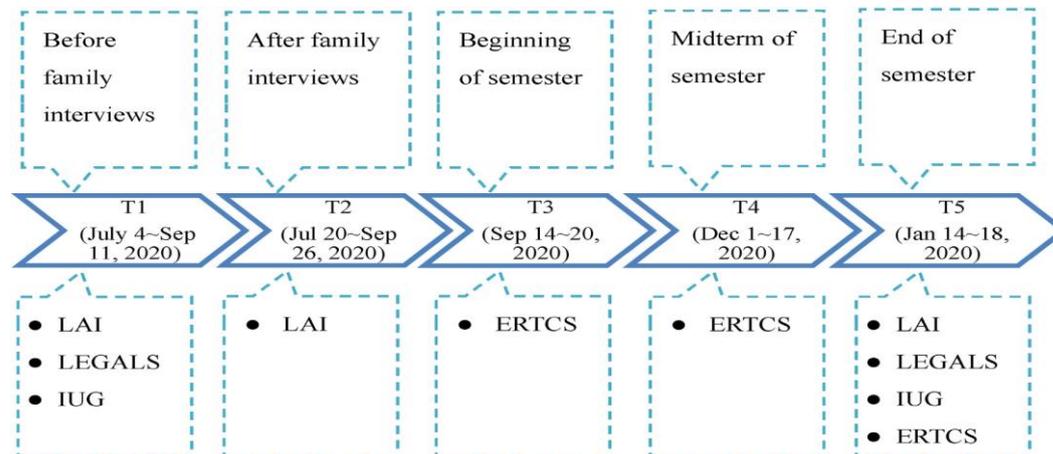


Figure 1 Timeline of the five-wave data collection process. Note: IUG, Inventory of Undergraduates’ Gratitude; LAI, Life Attitude Inventory; LEGALS, Learning Effectiveness of the Gross Anatomy Laboratory Scale; ERTCS, Emotional Reactions Towards Cadavers Scale.

Table 1 Means, standard deviations, and Pearson correlation matrix of variables that measured first time (N = 45).

	Mean	SD	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Age	20.69	2.73	0.40**	0.10	0.21	-0.18	0.20	0.21	0.00	0.40**	0.38**	0.30*	-0.46**
(2) Gender ^a	0.47	0.50		-0.27	-0.07	-0.23	-0.15	-0.21	0.10	0.04	-0.08	-0.06	-0.22
(3) Family relationship ^b	4.41	0.67			0.61**	0.28*	0.30*	0.42**	-0.22	0.35*	0.36*	0.35*	-0.03
(4) Physical and mental condition ^c	4.19	0.73				-0.02	0.28	0.31*	-0.27	0.37*	0.38**	0.38**	0.03
(5) Having religious belief ^d	0.47	0.50					-0.01	0.05	0.01	0.08	0.14	0.06	0.31
(6) Non-selfish ^e	5.81	1.04						0.72**	-0.27	0.39**	0.39**	0.58**	-0.08
(7) Caring and helping ^e	5.29	1.00							-0.22	0.55**	0.56**	0.77**	-0.12
(8) Death acceptance ^e	4.18	1.28								-0.10	0.01	-0.14	-0.01
(9) Positive life ^e	5.81	0.87									0.70**	0.77**	-0.17
(10) Learning attitudes ^f	6.15	0.74										0.76**	-0.35*
(11) Gratitude ^g	5.94	0.72											-0.06
(12) Negative emotions ^h	3.37	0.90											

*P < 0.05.
 **P < 0.01.
^a Male = 1, female = 0.
^b Rated on a Likert-type scale from 1 (very bad) to 5 (very good).
^c Rated on a Likert-type scale from 1 (very bad) to 5 (very good).
^d Yes = 1, no = 0.
^e Rated by the subscale of Life Attitude Inventory on a Likert-type scale from 1 (strongly disagree) to 7 (strongly agree).
^f Rated by the Learning Effectiveness of the Gross Anatomy Laboratory Scale on a Likert-type scale from 1 (strongly disagree) to 7 (strongly agree).
^g Rated by the Inventory of Undergraduates’ Gratitude on a Likert-type scale from 1 (never) to 6 (always).
^h Rated by the Emotional Reactions Towards Cadavers Scale on a Likert-type scale from 1 (strongly disagree) to 7 (strongly disagree).
 SD: standard deviation.

Data processing

We performed Pearson correlations to demonstrate bivariate correlations of variables (Table 1). Hierarchical regression analyses were used to examine whether participants’

negative emotions at T3, T4, and T5 could be predicted by the participants' gender, age, religious beliefs, self-perceived physical and mental condition, relationship with their families, life attitudes, learning attitudes, and gratitude levels.

RESULTS

From the Pearson correlation coefficients in Table 1, we found that the older the participants were, the weaker their negative emotions were, and the higher their learning attitudes, gratitude attitudes, high-level emotions, and excited emotions were. In addition, family relationship was positively correlated with the physical and mental condition, religion, learning attitudes, gratitude attitudes, and high-level emotions; physical and mental conditions were positively correlated with learning attitudes and gratitude; while learning attitudes were negatively correlated with the score of negative emotions, and positively correlated with that of high-level emotions. To exclude the above-mentioned influential variables, we executed hierarchical regression analyses to explore the predictors of negative emotions at T3, T4, and T5. We first put background variables into the prediction model in a stepwise analysis method and found that age effectively predicted negative emotions at the beginning of the semester (T3), which means that the older the students were, the weaker the negative emotions about seeing a cadaver. Next, after controlling for background variables with the entry method, we put the four life attitude scales (T1) into the prediction model stepwise, and found that positive life attitudes (T1) could predict negative emotions (T3), which means that students who were more positive toward life felt a lesser extent of negative emotions when they faced a cadaver for the first time. Although age and positive life attitudes could predict negative emotions at first sight, these two variables cannot be easily changed by educators in one semester. Therefore, we stepwise put the background variables, four life attitudes (T1), learning attitudes (T1), and gratitude attitudes (T1) into the prediction model, and found that learning attitudes (T1) could effectively predict negative emotions (T3), which means that when a student had a better learning attitude towards the gross anatomy laboratory, their negative emotions would be weaker when they saw a cadaver for the first time (Table 2). In Table 3, we tried to examine the effective predictors of mid-term negative emotions (T4), so the background variables and initial negative emotions (T3) were first put in the predictive model to control for their influences. Then learning attitudes (T1), gratitude attitudes (T1), and four life attitude scores after the family interviews (T2) were entered in the hierarchical regression analysis. The results showed that caring and helping (T2) could effectively predict negative emotions at the mid-term (T4), which means that the more a student was willing to care about and help others, the weaker their negative emotions were towards the cadaver.

In Table 4, we examined which variables could effectively predict students' negative emotions at the end of the semester (T5). We first controlled for background variables and negative emotions at the beginning of the semester (T3), and then learning attitude (T1), gratitude attitude

Table 2 Hierarchical regression analyses of negative emotions at Time 3.

Predictor variable	Regression 1			Regression 2			Regression 3		
	b	β	P	b	β	P	b	β	P
(Constant)	5.637			6.586			7.725		
Age	-0.114	-0.317	0.028*	-0.082	-0.227	0.129	-0.607	-0.154	0.302
Gender ^a		-0.143	0.326	-0.222	-0.123	0.399	-0.055	-0.211	0.144
Family relationship ^b		-0.013	0.931	-0.023	-0.017	0.935	-0.379	-0.120	0.553
Mental and physical condition ^c		0.011	0.942	0.199	0.171	0.400	-0.159	0.252	0.217
Having religious belief ^d		0.070	0.626	0.276	0.150	0.319	0.293	0.155	0.291
Positive life ^e (Time 1)				-0.403	-0.393	0.017*	0.284	-0.173	0.394
Non-selfish ^e (Time 1)								-0.078	0.635
Caring and helping ^e (Time 2)							0.110	0.511	
Death acceptance ^e (Time 1)							0.031	0.828	
Learning attitude ^f (Time 1)							-0.453	0.005**	
Gratitude attitude ^g (Time 1)							0.215	0.269	
ΔR^2		0.101		0.114			0.153		
ΔF		5.142		6.171			8.740		

* $P < 0.05$, ** $P < 0.01$.^a Male = 1, female = 0.^b Rated on a Likert-type scale from 1 (very bad) to 5 (very good).^c Rated on a Likert-type scale from 1 (very bad) to 5 (very good).^d Yes = 1, no = 0.^e Rated by the subscale of Life Attitude Inventory on a Likert-type scale from 1 (strongly disagree) to 7 (strongly agree).^f Rated by the Learning Effectiveness of the Gross Anatomy Laboratory Scale on a Likert-type scale from 1 (strongly disagree) to 7 (strongly disagree).^g Rated by the Inventory of Undergraduates' Gratitude on a Likert-type scale from 1 (never) to 6 (always).**Table 3** Hierarchical regression analyses of negative emotions at Time 4.

Predictor variable	Regression 1			Regression 2		
	b	β	P	b	β	P
(Constant)	1.088			3.032		
Age	0.044	0.151	0.417	0.079	0.273	0.143
Gender ^a	-0.045	-0.027	0.866	-0.089	-0.053	0.721
Family relationship ^b	-0.365	-0.268	0.163	-0.378	-0.278	0.124
Mental and physical condition ^c	0.050	0.042	0.824	0.128	0.108	0.551
Having religious belief ^d	0.342	0.204	0.233	0.086	0.051	0.767
Negative emotions ^e (Time 3)	0.610	0.679	0.001***	0.602	0.669	0.000***
Caring and helping ^f (Time 2)				-0.486	-0.361	0.045**
ΔR^2		0.536		0.076		
ΔF		4.625		4.513		

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.^a Male = 1, female = 0.^b Rated on a Likert-type scale from 1 (very bad) to 5 (very good).^c Rated on a Likert-type scale from 1 (very bad) to 5 (very good).^d Yes = 1, no = 0.^e Rated by the Emotional Reactions Towards Cadavers Scale on a Likert-type scale from 1 (strongly disagree) to 7 (strongly agree).^f Rated by the subscale of Life Attitude Inventory on a Likert-type scale from 1 (strongly disagree) to 7 (strongly disagree).

(T1), and the four life attitude scores after the family interview (T2) were entered in the hierarchical regression analysis. Results showed that gratitude attitudes (T1) could effectively predict negative emotions at the end of the semester (T4), which means that when students had stronger gratitude attitudes, the negative emotions towards the cadaver in the gross anatomy laboratory at the end of the semester were also weaker.

DISCUSSION

There is research on the emotional reactions of medical students who first encountered a cadaver, and results showed that younger students have stronger negative emotions,^{27,28} the same as we found in the present study. Older students who are relatively more emotionally stable could help to notice teammates seemingly having difficulty

Table 4 Hierarchical regression analyses of negative emotions at Time 5.

Predictor variable	Regression 1			Regression 2		
	b	β	P	b	β	P
(Constant)	-0.395			1.980		
Age	0.080	0.200	0.283	0.105	0.261	0.138
Gender ^a	0.279	0.125	0.441	0.219	-0.098	0.514
Family relationship ^b	-0.558	-0.347	0.117	-0.397	-0.247	0.232
Mental and physical condition ^c	0.224	0.147	0.503	0.211	0.138	0.495
Having religious belief ^d	0.254	0.113	0.489	0.264	0.118	0.436
Negative emotions ^e (Time 3)	0.836	0.680	0.001***	0.825	0.671	0.000***
Gratitude ^f (Time 1)				-0.582	-0.336	0.024*
ΔR^2		0.463			0.097	
ΔF		3.883			5.718	

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.^a Male = 1, female = 0.^b Rated on a Likert-type scale from 1 (very bad) to 5 (very good).^c Rated on a Likert-type scale from 1 (very bad) to 5 (very good).^d Yes = 1, no = 0.^e Rated by the Emotional Reactions Towards Cadavers Scale on a Likert-type scale from 1 (strongly disagree) to 7 (strongly agree).^f Rated by the subscale of Life Attitude Inventory on a Likert-type scale from 1 (strongly disagree) to 7 (strongly disagree).

in the gross anatomy laboratory. If necessary, referring students who have such difficulties during dissection to the student counseling center could help them resolve these psychological barriers to learning in the gross anatomy laboratory. However, we might need to keep a cautious approach to this explanation. Considering both the facts that the statistical dispersion of subjects' age in the present study is not very large (mean Z 20.69, SD Z 2.73) and that the dental education in Egypt has only been baccalaureate, further research in the future is needed to verify the influence of students' age. By controlling the influences of demographic variables, we investigated whether students' attitude towards life would affect their negative emotions when they first encountered a cadaver, and we found that a positive life attitude explained 11.4% of the variance. In general, the more-positive the life attitude of a student was, the weaker their negative emotions were when they first saw a cadaver. In the past, empirical research rarely explored the relationship between life positivity and negative emotions, but from the relevant theories and empirical results of positive psychology,^{29,30} it can be inferred that when students hold positive attitudes toward life, they are more capable of overcoming cognitive and emotional burdens. Assisting students who show negative attitudes towards life not only increases their mental health, but also avoids strong negative emotions when they see a cadaver. After excluding influences of demographic variables and the negative emotions when first encountering a cadaver (T3), caring and helping (T2) explained 7.6% of the variance of students' negative emotions after the midterms (T4). When students had a stronger tendency to help and care, they had weaker negative emotions towards the cadavers after the midterms. The related literature on reactions of dental students to the gross anatomy laboratory has rarely explored the relationship between these two variables. However, according to past research,⁹ it can be inferred that after half a semester's anatomy operation, students can deeply understand the silent mentor's great sacrifice for the students. Therefore, students with a strong tendency to care and help identified with their silent mentors, so that their negative emotions became weaker. Adopting the same statistical procedure, we controlled for influences of demographic variables and negative emotions at the beginning of the semester (T3) and found that gratitude explained 9.7% of the variance of students' negative emotions at the end of the semester (T5). The stronger the students' gratitude attitude was, the weaker the negative emotions were at the end of the semester (T5). The past literature pointed out that high-level emotions such as

gratitude can reduce negative emotions of medical students during the gross anatomy laboratory.⁶ The present study verified this again through a sample of dental students. Therefore, incorporating gratitude education into the gross anatomy course should enable students to have weaker negative emotions at the end of the semester (T5). This article investigated influential factors of dental students' negative emotions in the gross anatomy laboratory. Overall, positive attitudes or tendencies were determining factors, while negative emotions in previous stages were also crucial. This finding implies that when dental students are confused about the necessity of having to take the gross anatomy laboratory and encounter cadavers during the semester, they need more institutional support rather than personal coping strategies. Although we asked dental students to report their emotional feelings about cadavers, the negative emotions might come from not merely encountering the cadaver itself, but also the thought that it is unnecessary for dental students to take the gross anatomy class, especially the clinical relevance of gross anatomy in Egypt dental education had not gone through explicit debates as well as that in the European and American countries.^{11e13} The activities of the family interview or pre/post interview preparation may help dental students collectively develop positive emotions and mature learning attitudes. However, dental educators and planners in Egypt seldom design or deliver humanities-related courses to dental students who might not be required to take some compulsory courses in medical humanities. It is ironic that dental students receive humanity-oriented components during the gross anatomy course because of standardized implementation of gross anatomy applied to both medical and dental students. Regardless of this special contingency, dental students have few opportunities to learn about humanities-loaded content during their 6-year education and training. In this sense, dental students are a neglected group in the medical professional educational system. Considering the uniqueness of dental students' situation in terms of the gross anatomy laboratory, we propose two suggestions for future planners in dental education: either increase the clinical relevance of the gross anatomy course through reforming the curriculum to more closely focus on dental education, or incorporate more humanistic activities in dental courses from basic science to the clinical stage. Combining both educational lessons in Egypt and creative endeavors outside Egypt, such as interdisciplinary reaching, peer teaching, or board games, in the dental gross anatomy laboratory,^{31e33} we believe that dental students in Egypt would benefit from a future curriculum that synthesizes professional and humanity components.

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