ARAŞTIRMA MAKALESİ / *RESEARCH ARTICLE*

The Relationship Between Medical Students' Attitudes Toward Anatomy, Learning Approaches, and Academic Self-Efficacy: A Cross-Sectional Study

Tıp Öğrencilerinde Anatomi Dersine Yönelik Tutumun Öğrenme Yaklaşımı ve Akademik Öz-Yeterlilik ile İlişkisi: Kesitsel Bir Çalışma

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ABSTRACT

Aim: *This study examined the relationships among attitudes toward anatomy courses, learning approaches (deep and surface learning), and academic self-efficacy among first- and second-year medical students.*

Materials and methods: *This cross-sectional study included 172 medical students from Kafkas University (first year: 98; second year: 74). Data were collected through an online survey using a personal information form, the Attitude Scale Toward Anatomy Course, the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F), and the Academic Self-Efficacy Scale. Data were analyzed using IBM Statistical Package for Social Sciences (SPSS) program version 25.*

Results: *Anatomy attitude scores were significantly lower among first-year students than among second-year students. Deep learning scores were higher in first-year students, whereas surface learning scores were higher in second-year students. In second-year students, anatomy attitude was positively associated with deep learning and negatively associated with surface learning. Academic self-efficacy was not associated with attitudes toward anatomy or learning approaches in either group. Regression analysis showed that the variables included in the model did not significantly predict attitudes toward anatomy.*

Conclusion: *Attitudes toward anatomy and learning approaches differed between first- and second-year students. Strategies that promote effective learning may improve attitudes toward anatomy, particularly during the early stages of medical education.*

Key words: *anatomy; attitude; medical students; learning; self-efficacy*

ÖZET

Amaç: *Bu çalışmanın amacı, Dönem 1 ve Dönem 2 tıp öğrencilerinde anatomi dersine yönelik tutum ile öğrenme yaklaşımları (derin/yüzeysel) ve akademik öz-yeterlilik arasındaki ilişkiyi incelemektir.*

Gereç ve Yöntem: *Bu kesitsel çalışmaya Kafkas Üniversitesi Tıp Fakültesi'nden 172 tıp öğrencisi (Dönem 1: 98; Dönem 2: 74) dahil edildi. Veriler, kişisel bilgi formu, Anatomi Dersine Yönelik Tutum Ölçeği, Revize Edilmiş İki Faktörlü Çalışma Süreci Ölçeği (R-SPQ-2F) ve Akademik Öz-Yeterlilik Ölçeği kullanılarak çevrim içi anket yöntemiyle toplandı. Veriler IBM SPSS Statistics 25 yazılımı kullanılarak analiz edildi.*

Bulgular: *Anatomi dersine yönelik tutum puanları Dönem 1 öğrencilerinde Dönem 2 öğrencilerine göre anlamlı olarak daha düşüktü. Derin öğrenme yaklaşımı puanları Dönem 1 öğrencilerinde, yüzeysel öğrenme yaklaşımı puanları ise Dönem 2 öğrencilerinde daha yüksekti. Dönem 2 öğrencilerinde anatomi tutumu ile derin öğrenme arasında pozitif, yüzeysel öğrenme arasında ise negatif ilişki saptandı. Her iki grupta da akademik öz-yeterlilik ile anatomi tutumu veya öğrenme yaklaşımları arasında anlamlı bir ilişki bulunmadı. Regresyon analizi, modele dahil edilen değişkenlerin anatomi dersine yönelik tutumu anlamlı düzeyde yordamadığını gösterdi.*

Sonuç: *Anatomi dersine yönelik tutum ve öğrenme yaklaşımları Dönem 1 ve Dönem 2 öğrencileri arasında farklılık göstermektedir. Etkili öğrenme yaklaşımlarını destekleyen eğitim stratejileri, özellikle tıp eğitiminin erken dönemlerinde öğrencilerin anatomi dersine yönelik tutumlarının geliştirilmesine katkı sağlayabilir.*

Anahtar kelimeler: *Anatomi, tutum, tıp öğrencileri, öğrenme, akademik öz-yeterlilik*

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Introduction

Anatomy is a cornerstone of medical education, providing the structural knowledge required for disease diagnosis, treatment, surgery, and radiological interpretation (1,2). Consequently, anatomy curricula and teaching methods have been continuously updated to meet evolving international standards (1,3).

Recent advances, including virtual dissection tables and hybrid laboratory models, have transformed anatomy education (2,4). Despite these developments, anatomy remains one of the most cognitively demanding courses in medical school, often reducing students' motivation and classroom engagement (5,6). Since students' attitudes influence learning behaviors and educational outcomes, evaluating these attitudes is important for assessing the effectiveness of anatomy education (7,8).

Students generally adopt either deep or surface learning approaches. Deep learning promotes conceptual understanding and long-term retention, whereas surface learning is primarily examination-oriented and relies on short-term memorization (9). Deep learning has been associated with better academic performance, particularly in disciplines such as anatomy that require spatial reasoning (10). Academic self-efficacy, defined as students' belief in their ability to successfully perform academic tasks, has also been linked to academic achievement and learning motivation among medical students (7,11).

Although previous studies have investigated learning methods, cadaver-based education, and technology-assisted anatomy teaching, evidence regarding the relationships among anatomy attitudes, learning approaches, and academic self-efficacy remains limited (12,13). Therefore, this study aimed to examine the associations between attitudes toward anatomy courses, learning approaches, and academic self-efficacy among medical students.

Materials and methods

Ethical Approval

This study was approved by the Kafkas University Faculty of Health Sciences Non-Interventional Research Ethics Committee (Decision No: 8; Decision Date: 30.12.2025; No: 81829502.903/152). Written informed consent was obtained from all participants before enrollment. The study was conducted in accordance with the Declaration of Helsinki.

Research Design and Sample

This cross-sectional study included first- and second-year students enrolled in the Faculty of Medicine at Kafkas University. Participation was voluntary, and eligible students completed an anonymous online questionnaire developed using Google Forms. The questionnaire consisted of a Personal Information Form, the Attitude Scale Toward Anatomy Course, the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F), and the Academic Self-Efficacy Scale. Completion required approximately 10–15 minutes, and participants were free to withdraw from the study at any time without providing a reason.

Eligible participants were medical students aged 18 years or older who had taken or were currently taking the anatomy course, voluntarily agreed to participate, and completed the questionnaire. Students who did not meet these criteria or submitted incomplete questionnaires were excluded.

The required sample size was estimated using G*Power 3.1. Assuming a medium effect size (r=0.30), a significance level of 0.05, and 80% statistical power, a minimum sample size of 84 participants was calculated. To compensate for possible missing data or non-response, the target sample size was increased to 100 students.

Data Collection Tools

Personal Information Form

The Personal Information Form was developed by the researchers to collect demographic information, including age, sex, academic term, weekly anatomy study time and perceived anatomy self-efficacy.

Attitude Scale Toward Anatomy Course

The Attitude Scale Toward Anatomy Course is a validated five-point Likert instrument that assesses students' attitudes toward anatomy across commitment, positive and negative behaviors, prejudice, and perceived necessity of the course. Negatively worded items were reverse-scored before analysis. Higher scores indicate more positive attitudes toward anatomy. Item mean scores were used for statistical analyses (14).

Revised Two-Factor Study Process Questionnaire (R-SPQ-2F)

Learning approaches were assessed using the Turkish version of the R-SPQ-2F. The questionnaire consists of 20 items evaluating deep and surface learning approaches using a five-point Likert scale. No reverse scoring was required. Subscale scores were calculated

as the mean of the relevant items, with higher scores indicating greater use of the corresponding learning approach (15).

Academic Self-Efficacy Scale

Academic self-efficacy was assessed using the Turkish version of the Academic Self-Efficacy Scale. The instrument uses a four-point Likert scale, and Item 7 was reverse-scored before analysis. Mean scores were calculated for statistical analyses, with higher scores indicating greater academic self-efficacy (16).

Statistical Analysis

Statistical analyses were performed using IBM Statistical Package for Social Sciences (SPSS) program version 25. Continuous variables are presented as mean ± standard deviation (SD) and categorical variables as frequency (%). Normality and homogeneity of variance were assessed using the Shapiro-Wilk and Levene tests, respectively. Group comparisons were performed using the independent-samples t-test, Welch's t-test, or the Mann-Whitney U test, as appropriate. Pearson's or Spearman's correlation analyses were used to examine the relationships between anatomy attitude scores, learning approaches, and academic self-efficacy. Multiple linear regression analysis was performed to identify factors associated with anatomy attitude scores. Statistical significance was set at $p < 0.05$.

Results

The demographic characteristics of the participants are presented (Table 1).

Compared with second-year medical students, first-year medical students had significantly lower anatomy attitude scores ($p=0.001$). In contrast, deep learning scores were higher in first-year students ($p < 0.001$), whereas surface learning scores were higher in second-year students ($p=0.003$) (Table 2).

Correlation analysis demonstrated that, among second-year students, anatomy attitude scores were positively correlated with deep learning ($\rho=0.294$, $p=0.011$) and negatively correlated with surface learning ($\rho=-0.291$, $p=0.012$). No significant correlations were found between anatomy attitude and the other study variables among first-year students. Academic self-efficacy was not associated with attitude toward anatomy in either group (Table 3).

Table 1. *Demographic characteristics of the participants by class year*

Variable	Category	First-year students n (%)	Second-year students n (%)
Age (years)	18–20	78 (79.6)	41 (55.4)
	21–23	18 (18.4)	27 (36.5)
	≥24	2 (2.0)	6 (8.1)
Sex	Female	60 (61.2)	44 (59.5)
	Male	38 (38.8)	30 (40.5)
Class year	First-year students	98 (100.0)	—
	Second-year students	—	74 (100.0)
High school type	Science high school	55 (56.1)	40 (54.1)
	Anatolian high school	36 (36.7)	28 (37.8)
	Other	7 (7.1)	6 (8.1)
Weekly anatomy study time	0–1 h	30 (30.6)	34 (45.9)
	2–3 h	32 (32.7)	21 (28.4)
	4–6 h	26 (26.5)	14 (18.9)
	7–10 h	9 (9.2)	4 (5.4)
	>10 h	1 (1.0)	1 (1.4)
Anatomy self-efficacy (single item, 1–4)	1 (Not at all sufficient)	50 (51.0)	28 (37.8)
	2 (Slightly sufficient)	34 (34.7)	28 (37.8)
	3 (Moderately sufficient)	13 (13.3)	16 (21.6)
	4 (Sufficient)	1 (1.0)	2 (2.7)

First-year students, n=98; Second-year students, n=74.

Table 2. *Comparison of anatomy attitudes, learning approaches, and academic self-efficacy scores of first and second-year students*

Variable	First-year students (n=98) Mean ± SD	Second-year students (n=74) Mean ± SD	Test	p	Effect size
Attitude toward anatomy scale for medical students (14–70)	40.50±11.56	46.76±12.17	U test	0.001	r=0.25
Study process questionnaire (R-SPQ-2F)					
Deep approach subscale (10–50)	30.21±5.64	27.14±5.93	t-test	<0.001	d=0.53
Surface approach subscale (10–50)	29.80±6.18	32.70±6.51	t-test	0.003	d=0.46
Academic self-efficacy scale (7–28)	17.20±4.35	18.00±4.58	t-test	0.244	d=0.18

Mean: arithmetic mean; SD: standard deviation; p: significance level; R-SPQ-2F: revised two-factor study process questionnaire; t-test: independent samples t-test; U test: Mann-Whitney U test; d: Cohen's d; r: effect size for Mann-Whitney U test.

Table 3. *Correlations between anatomy attitude and other scale scores in first and second-year students*

Variable	First-year students ρ (ρ)	Second-year students ρ (ρ)
Deep approach (R-SPQ-2F)	0.032 (0.752)	0.294* (0.011)
Surface approach (R-SPQ-2F)	-0.054 (0.601)	-0.291* (0.012)
Academic self-efficacy	0.038 (0.713)	0.159 (0.177)

ρ: Spearman correlation coefficient; (p): significance level; *: p<0.05.

Table 4. *Multiple linear regression analysis predicting anatomy attitude scores in second-year students*

Predictor	B	SE	t	p	95% CI
Deep approach (R-SPQ-2F)	0.171	0.248	0.691	0.492	-0.323 to 0.666
Surface approach (R-SPQ-2F)	-0.381	0.200	-1.907	0.061	-0.781 to 0.019
Academic self-efficacy	0.231	0.283	0.816	0.418	-0.334 to 0.796
Weekly anatomy study time	0.779	1.018	0.765	0.447	-1.254 to 2.812
Perceived anatomy self-efficacy (single item, 1–4)	2.062	1.719	1.200	0.234	-1.368 to 5.492

B: unstandardized regression coefficient; SE: standard error; t: t-statistic; p: significance level; 95% CI, 95% confidence interval.

Table 5. *Multiple linear regression analysis predicting anatomy attitude scores in first-year students*

Predictor	B	SE	t	p	95% CI
Deep approach (R-SPQ-2F)	0.093	0.217	0.427	0.670	-0.338 to 0.524
Surface approach (R-SPQ-2F)	-0.142	0.182	-0.779	0.438	-0.504 to 0.220
Academic self-efficacy	0.094	0.269	0.351	0.726	-0.440 to 0.628
Weekly anatomy study time	0.278	0.842	0.330	0.742	-1.393 to 1.949
Perceived anatomy self-efficacy (single item, 1–4)	0.817	1.443	0.566	0.573	-2.048 to 3.682

B: unstandardized regression coefficient; SE: standard error; t: t-statistic; p: significance level; 95% CI, 95% confidence interval.

Multiple linear regression analysis showed that none of the variables included in the model significantly predicted anatomy attitude scores among second-year students (Table 4). Although the surface learning approach showed a negative association with attitude toward anatomy, this relationship did not reach statistical significance (B=-0.381, p=0.061).

Similarly, none of the variables included in the regression model significantly predicted anatomy attitude scores among first-year students (Table 5).

Discussion

The most important finding in this study is that first-year students' attitudes toward anatomy class were lower than those of second-year students. Additionally, while first-year students had high deep-learning approach scores, second-year students had high surface-learning approach scores. A positive correlation was observed between anatomy attitudes and deep learning approaches among second-year students, while a negative correlation was observed between anatomy attitudes and surface learning. The absence of a significant relationship among first-year students' attitudes toward anatomy, learning approaches, and academic self-efficacy is an unexpected finding of the study. The absence of a significant relationship between academic self-efficacy and other variables in both groups is another unexpected result. The multiple regression analysis shows that attitude toward anatomy is not significantly related to the other variables in the model, indicating that students' attitudes toward the course have a multidimensional, complex structure.

Our study found that first-year students had significantly less positive attitudes toward anatomy than second-year students. This finding may reflect the cognitive load and adaptation challenges experienced during the early stages of medical education, when students are first exposed to the extensive terminology and complexity of anatomy. Previous studies have similarly shown that increasing clinical exposure and experience enhance students' appreciation of the role of anatomy in medical practice, leading to more positive attitudes toward the course (17,18). In addition, several educational factors, including teaching methods, learning resources, online education, and cadaver-based instruction, have been reported to influence students' attitudes toward anatomy (19–21). These findings suggest that attitudes toward anatomy are shaped by both educational experiences and students' developing understanding of the clinical relevance of anatomical knowledge. Since both groups in the present study followed the same committee-based curriculum and teaching methods, the observed differences are more likely attributable to students' academic experience and adaptation to medical education rather than differences in instructional approaches.

In our study, first-year students predominantly adopted a deep learning approach, whereas second-year students showed higher surface learning scores. This shift may reflect increasing examination pressure, academic workload, and time constraints throughout medical education. Previous studies have similarly reported that deep learning predominates during the early stages of medical education but tends to decline as curricular demands increase (22,23). Furthermore, deep learning has been associated with greater clinical orientation, whereas surface learning appears to be influenced more by external factors such as prestige, role models, and career expectations (24). In contrast, a study conducted among Qatari medical students reported the highest deep learning scores in third-year students rather than first-year students (25). This discrepancy may be explained by differences in curriculum structure and the degree of clinical integration, which may encourage students to adopt deeper learning strategies during the clinical years.

In our study, students' academic self-efficacy levels were not significantly related to their attitudes toward anatomy or their learning approaches. This situation may stem from the fact that the medical education process is a more complex and multidimensional structure that cannot be explained solely by individual beliefs. A review of the literature reveals that significant correlations have been reported between academic self-efficacy and academic achievement in students in terms of learning behaviors and test anxiety levels (26,27). A study conducted among medical students revealed that academic self-efficacy increased significantly among students aged 24 and above and among those who graduated from Anatolian high schools (27). Another study reported a significant negative correlation between medical students' neurotic personality and their academic self-efficacy (26). A study involving therapy and rehabilitation students examined changes in attitudes toward anatomy courses and in academic self-efficacy before and after training. Positive changes were observed in both students' attitudes toward anatomy courses and their academic self-efficacy following spiral model anatomy training (28). This situation demonstrates that students' academic self-efficacy and attitudes toward the course can change with education. In a study evaluating academic self-efficacy and self-directed learning skills among nursing students, a positive correlation was observed between the two constructs. A significant relationship has also been found between academic self-efficacy and participation in learning. In this case, students' academic self-efficacy and learning participation will increase, leading to a rise in self-directed learning. Consequently, their attitude towards the course may also change (29). Another study conducted on medical school students found a

positive and significant relationship between academic self-efficacy and psychological well-being and its subdimensions. Furthermore, while a significant relationship was found between academic self-efficacy and students' grade point averages, faculty, and education levels, no relationship was found between genders (30). These findings indicate that in medical education, not only academic competence but also external factors such as a heavy curriculum, the examination system, course load, and psychological state affect attitudes toward anatomy and learning approaches. For this reason, the fact that our study did not find a significant relationship between academic self-efficacy and attitude toward anatomy and learning approach indicates that multiple variables are involved in medical education. Furthermore, since academic self-efficacy is more closely related to abstract concepts such as overall academic performance and belief in individual success, its direct relationship with attitude toward the course and approach to learning may be weak. When our sample is subject to similar teaching and evaluation criteria within the same institution, the statistical power to examine the relationships among students' self-efficacy, attitudes, and learning methods may be limited.

This study has some limitations. The cross-sectional nature of our study, its single-center design, the participation of only first and second-year students, and the lack of comparison with other medical schools or different educational settings may limit the generalizability of the study's findings. The use of self-report scales in data collection may have led to measurement bias, such as individuals' tendency to respond subjectively and respond in a certain way. Finally, variables that could affect measurements, such as students' test anxiety, stress levels, learning environment factors, and learning environment methods, were not analyzed.

Our study observed that attitudes toward anatomy courses differed between first- and second-year students. First-year students used deep learning approaches in their education, while second-year students preferred surface learning approaches. A positive correlation was found between second-year students' deep learning approaches and their attitude toward anatomy, while a negative correlation was found between surface learning and their attitude toward anatomy. No significant relationship was found between students' academic self-efficacy and their attitude toward anatomy or their learning approach.

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