

Physician assistant anatomy education: does prior anatomy experience predict performance?

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Claire E. Terhune, Betsy Q. Melcher, Andrea B. Taylor
Department of Community and Family Medicine, Duke University School of Medicine, Durham NC

INTRODUCTION and PROJECT GOALS

Anatomy education in the Duke Physician Assistant (PA) program has historically been prosection-based and heavily clinically oriented, and was delivered by surgical fellows and residents, PA clinicians, and PA faculty. Based on alumni feedback, in 2009 this course was transformed into a foundational anatomy course with student-performed dissection and led by a biological anthropologist. This modification included additional lab and lecture time, and as part of this modification data were collected describing incoming students' prior anatomy experience. These data were used to combine experienced and non-experienced students into lab groups to optimize group learning and maximize lab resource use. At present we have data for four years of students in this new anatomy curriculum.

The goal of this study was to evaluate whether these data describing past anatomy experience can be used to predict anatomy course performance and/or performance on the Physician Assistant Clinical Knowledge Rating and Assessment Tool (PACKRAT) and the Physician Assistant National Certifying Exam (PANCE).



The Duke University PA program building (left) and the cadaver dissection lab in the Duke South Clinic (right).

MATERIALS and METHODS

As part of their preparation for the upcoming didactic year, incoming students received surveys two months prior to matriculation. Surveys requested information on past anatomy experience and asked the students to rank their comfort level with performing human cadaver dissections (Table 1). Responses were coded as dummy variables and collated with final anatomy course scores and student performance on the PACKRAT, which is taken in both the first and second years of the curriculum, and the PANCE, which is taken following completion of PA school. For each student, we also compiled background information describing sex, age, and prior academic performance. All identifying information for each student was removed. This protocol was determined to be exempt from review by the Duke University Health System Institutional Review Board (IRB) (Protocol ID: Pro00041943).

Table 1. Data analyzed in this study.

Variable Name	Variable type and levels
Sex	Female (1), Male (2)
Birth year	Continuous variable
Grade point average (GPA)	Continuous variable
Quantitative GRE	Continuous variable
Verbal GRE	Continuous variable
Analytical GRE	Continuous variable
Natural science GPA	Continuous variable
Number of natural science credits	Continuous variable
Course level	Undergraduate (1); Postgraduate (2); Both undergraduate and postgraduate (3)
Semesters	One semester (1); Two semesters (2); Three or more semesters (3)
Dissection experience	Virtual dissection only (0); Prosection or plastinated specimens (1); combination of prosection and dissection (2); dissection only (3)
Human cadaver experience	No (1); Yes (2)
Comfort level with human dissection	Uncomfortable (1); comfortable with supervision (2); somewhat comfortable (3); fairly comfortable (4); very comfortable (5)
TA experience	No (1); Yes (2)
Skill level summary	Sum of course level, semesters, dissection experience, human cadaver experience, comfort level, and TA experience.
Final anatomy grade	Continuous variable
PACKRAT Year 1 % score	Continuous variable
PACKRAT Year 2 % score	Continuous variable
PANCE scores	Continuous variable

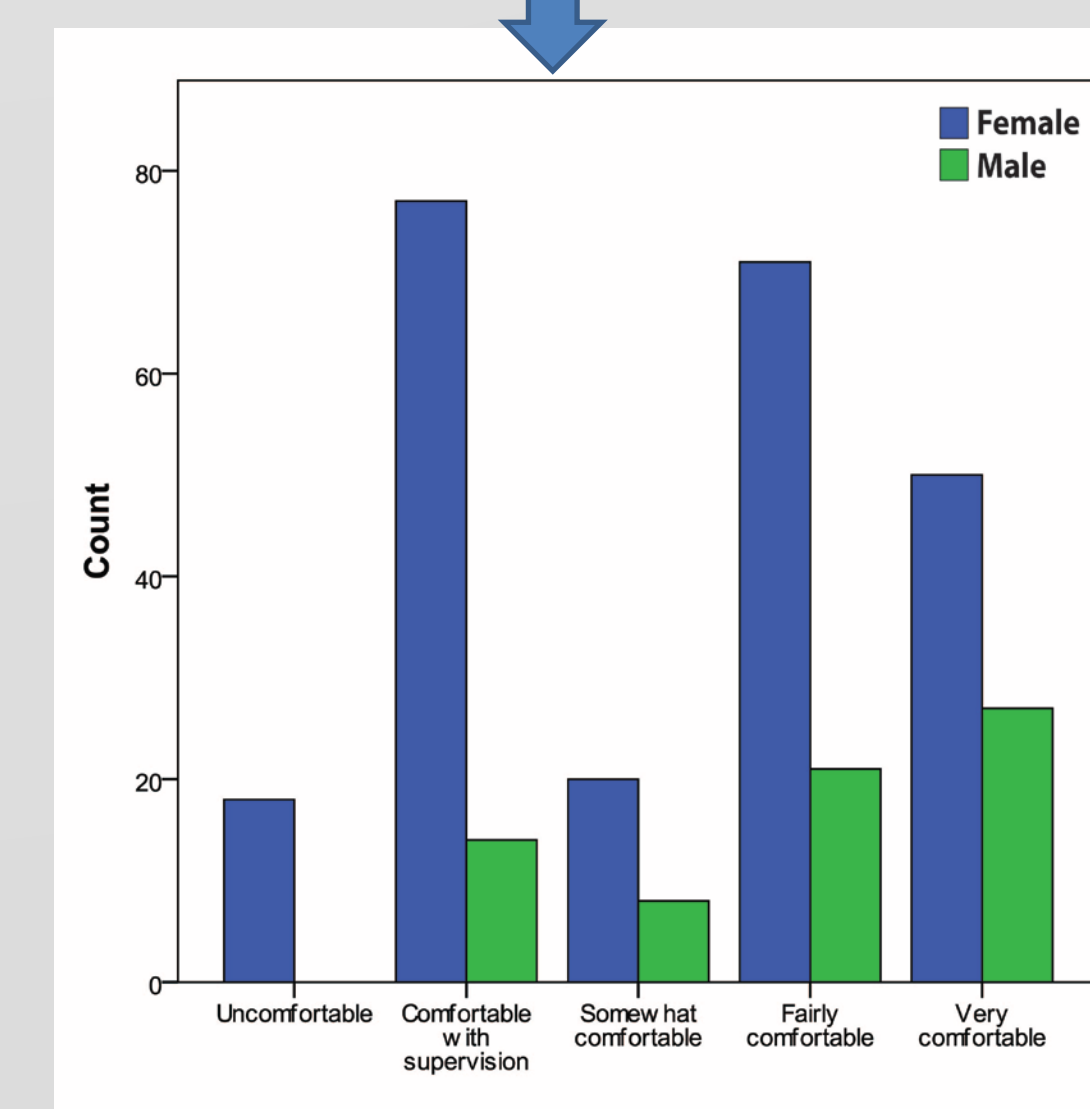
Relationships between prior anatomy experience and performance in the course and on the PACKRAT and PANCE were examined using linear regression analysis where performance outcomes were the dependent variables. Multiple regressions incorporating sex, age, and measures of prior academic performance (e.g., GPA) were also performed. Differences in performance across years were examined using one-way analysis of variance (ANOVA) with a Tukey HSD test for multiple post-hoc comparisons. Our *a priori* alpha was set at 0.05, and we corrected for Type 1 error using a sequential Bonferroni adjustment (Rice 1989).

RESULTS

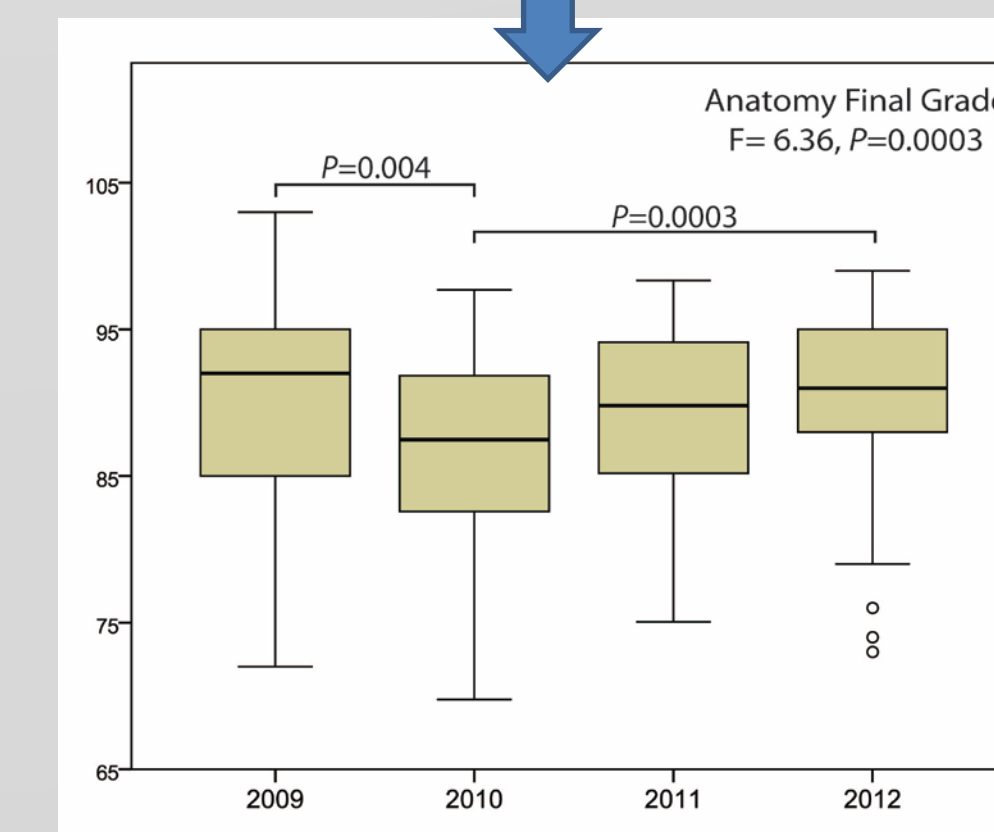
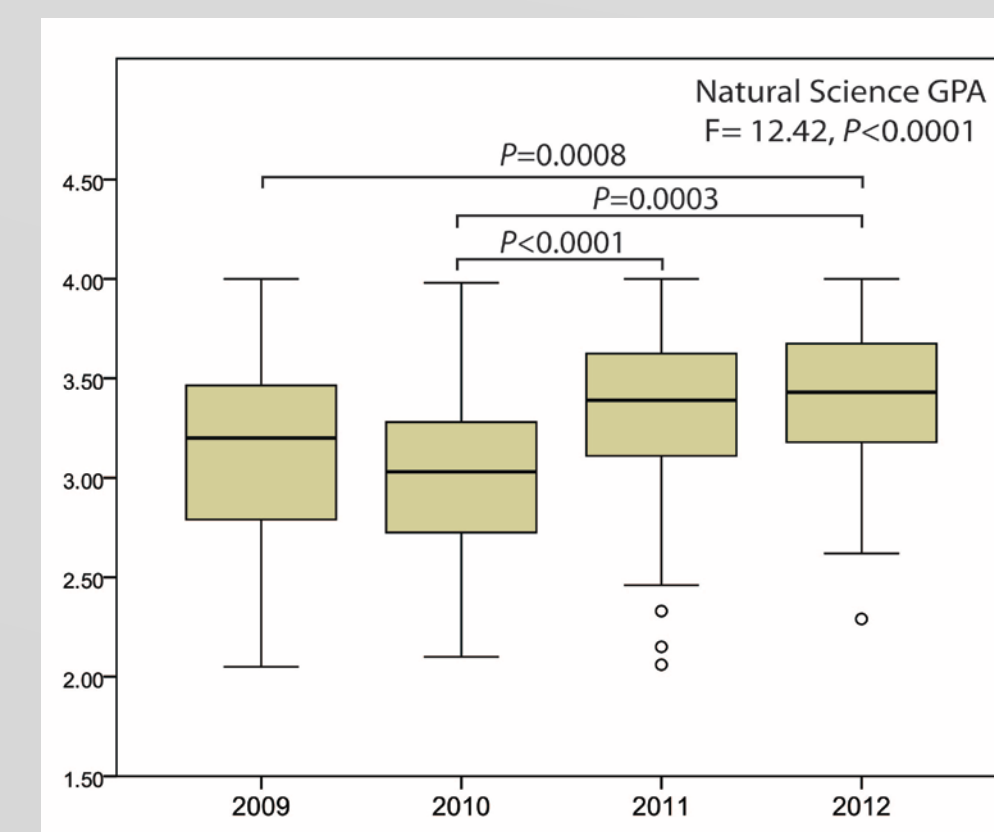
- Most students entered Duke with two semesters of undergraduate anatomy
- 41% of students had experience with plastinated and prosected specimens (human and non-human), and 37% percent reported experiencing a combination of prosection and dissection
 - Few students had only virtual dissection (7%) or human cadaver dissection (13%)
 - 60% of incoming students had not previously worked with a human cadaver
- When asked to rank their comfort level with performing human cadaver dissection, most students indicated that they were comfortable with supervision, fairly comfortable, or very comfortable
 - There was a sex difference in reported comfort levels; over four years, most male students reported that they were very comfortable with cadaver dissection and none considered themselves as uncomfortable with cadaver dissection. Conversely females most commonly categorized themselves as 'comfortable with supervision' and 18 females listed themselves as uncomfortable

Means for the pre-PA school and PA school performance measures.

		2009	2010	2011	2012
Pre-PA School Performance	GPA	3.43	3.40	3.45	3.50
	Quantitative GRE	652	658	653	657
	Verbal GRE	516	521	522	546
	Analytical GRE	4.3	4.3	4.3	4.2
	Natural science credits	61	67	60	60
PA School Performance	Natural science GPA	3.16	3.04	3.32	3.42
	Final Grade	90	87	89	91
	PACKRAT Year 1 %	57%	60%	57%	
	PACKRAT Year 2 %	66%	64%		
	PANCE score	567	495		



- The only pre-PA school performance measure that differed significantly among classes was NSGPA, which is significantly lower in 2009 relative to 2012 and lower in 2010 relative to 2011 and 2012
- One-way ANOVAs suggest that the anatomy course grades were significantly lower in 2010 when compared to 2009 and 2012



- All regressions of anatomy scores, PACKRAT, and PANCE scores on skill level sum and individual skill level questions were non-significant ($P > 0.05$)
- Regression models where sex, age, natural science GPA and skill level were included as predictors indicate that age (negative correlation) and NSGPA (positive correlation) are significantly related to anatomy, PACKRAT, and PANCE performance

Sex, Age, NSGPA, and Skill Level vs.	r-squared	P-value	Significant factors
Anatomy final grade	0.28	<0.0001	Age (<0.0001), NSGPA (<0.0001)
PACKRAT Year 1	0.09	0.0004	Sex (0.016), NSGPA (0.007)
PACKRAT Year 2	0.22	<0.0001	Age (0.004), NSGPA (<0.0001)
PANCE	0.19	<0.0001	Age (0.011), NSGPA (0.0002)

- Anatomy scores weakly predict PACKRAT and PANCE performance

Anatomy grades vs.	r-squared	P-value
PACKRAT Year 1	0.10	<0.0001
PACKRAT Year 2	0.38	<0.0001
PANCE	0.27	<0.0001

Descriptive statistics describing sex, age, and previous anatomy experience for students in 2009-2012.

	2009	2010	2011	2012	
Total Students					
	72	75	80	84	
Sex	Female	52	53	67	68
	Male	20	22	13	16
Average Birth Year					
	1981	1983	1983	1984	
Number of semesters	One semester	24	19	26	22
	Two semesters	33	38	36	45
	Three semesters	11	13	12	14
	Bachelor's degree	3	0	2	2
	Postgraduate work	1	3	2	1
Dissection?	Virtual dissection	9	4	6	4
	Plastinated and prosected specimens	27	27	34	40
	Combination of prosection and dissection	28	28	30	28
	Dissection only	8	12	8	12
Cadaver Code	No	45	43	46	54
	Yes	27	30	32	30
Comfort level	Uncomfortable	5	6	4	3
	Comfortable with supervision	20	20	26	25
	Somewhat comfortable	7	5	7	9
	Fairly comfortable	24	17	24	27
	Very comfortable	16	24	17	20
TA experience?	No	66	64	73	80
	Yes	6	9	5	4

DISCUSSION and CONCLUSIONS

The majority of Physician Assistant programs across the country (86%) require anatomy as an entrance pre-requisite (Rizzolo et al., 2011; PAEA, 2011). However, few programs delineate exactly what this previous anatomy experience should entail. At the Duke PA program, students are required to have taken at least one three or four credit anatomy course, and while lab experience is encouraged, it is not required. The data presented here suggest students enter the Duke PA program with a vast array of anatomy experience, ranging from virtual dissection only to full human cadaver dissection. In fact, many of the incoming students have never worked with cadaver tissue and report discomfort at the idea of human cadaver dissection. However, these data also suggest that the level of anatomy experience prior to entering PA school does not predict PA school performance, either in the anatomy course itself, or on the PACKRAT or PANCE. This could suggest two interpretations: 1) utilizing prior experience data to ensure that lab groups contain a mixture of experience levels allows less experienced students to perform better overall, and/or 2) students who have had little anatomy experience would perform well in PA school regardless of their prior anatomy experience.

While there is little relationship between past anatomy experience and performance, past academic performance (NSGPA) and age were found to significantly predict PA school performance, with age negatively correlated with performance, and NSGPA positively correlated with performance. This negative correlation between age and performance may be a result of more demands on older students' time (e.g., families, children), or because older applicants are more likely to be admitted with slightly lower GPAs but more applicable and extensive clinical experience (data not reported here). Finally, although the variance explained by the regression of PACKRAT and PANCE scores on anatomy performance is low, these relationships are highly significant. Given that so many other factors influence PACKRAT/PANCE performance, this result deserves further consideration, particularly in the context of other preclinical and clinical course performance.

We caution that these results may be specific to the Duke PA program and that similar data in other programs could yield different results. We also note that these data have no ability to speak to whether Duke PA student performance differs significantly when anatomy is prosection or dissection based. We found no significant differences in anatomy, PACKRAT, or PANCE performance from when anatomy was prosection-based (e.g., instruction prior to 2009); however, we have no ability to judge how students would perform in the current course if only prosections were performed. Student feedback has overwhelmingly been positive and students value the hands-on experience that dissection provides them. When asked whether they believe that their dissection skills improved throughout the course, between 97 and 100% of students agree, while only 81-90% report having been comfortable with dissection at the start of the course. These data suggest that human cadaver dissection is a valuable component of education in the Duke PA program.

ACKNOWLEDGEMENTS

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LITERATURE CITED

PAEA. 2011. Twenty-sixth annual report on physician assistant educational programs in the United State, 2009-2010. Alexandria, VA: Physician Assistant Education Association. URL: www.paeonline.org/index.php?ht=d/sp/1/243/pld/243.
Rice WR. 1989. Analyzing tables of statistical tests. *Evol* 43:223-225.
Rizzolo et al. 2011. Effectiveness of a shortened, clinically engaged anatomy course for physician assistant students. *Anat Sci Ed* 4:64-70.

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