Degrees of Separation - ABPath Primary Examination
Pass Rate Differences by Degree (MD vs. DO; MD vs. MD,PhD) from 2006 to 2022

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BACKGROUND & OBJECTIVE

The American Board of Pathology administers two Primary Certification Examinations each year for practicing pathologists in Anatomic Pathology (AP) and Clinical Pathology (CP). Most candidates and diplomates hold Doctor of Medicine (MD) degrees, but some candidates may instead hold Doctor of Osteopathy (DO) degrees or the combination of Doctor of Medicine and Doctor of Philosophy (MD,PhD), among others. It has been observed on occasion that DO candidates have had more difficulty passing the ABPath Primary Certification Examinations than MD candidates. The ABPath sought to determine whether MD candidates significantly and meaningfully differed in their pass rates versus DO candidates. Additionally, the ABPath wanted to see whether MD,PhD candidates performed differently from MD candidates.

METHODS

The ABPath gathered all pass/fail results from the AP and CP exams from 2006 to 2022 for first-time candidates. The candidates were separated by degree into three groups: MD; DO; and MD,PhD. All candidates holding other degrees (MBBS, MbChB, etc.) were excluded from this study. Comparisons were done between MD and DO candidates and MD and MD,PhD candidates; DO and MD,PhD candidates were not directly compared.

Due to the large number of candidates, hypothesis testing may provide significant results for spurious effects. Therefore, odds ratios and Cohen's *d* effect sizes were calculated to determine the extent of a degree type's effect on pass rates over that on another degree type.

First, the odds ratio between MD and DO or MD,PhD and MD was calculated for each individual year and the entire 17-year period from 2006 to 2022. The formula for the bias-corrected odds ratio (OR) is:

$$OR = \left(\frac{P_{MD}}{F_{MD}}\right) \Big/ \left(\frac{P_{DO}}{F_{DO}}\right); OR = \left(\frac{P_{MDPhD}}{F_{MDPhD}}\right) \Big/ \left(\frac{P_{MD}}{F_{MD}}\right)$$

where *P* is the number of passing candidates and *F* is the number of failing candidates for MD, DO, or MD,PhD candidates. These odds ratios were then converted into the logarithmic odds ratio (LOR):

$$LOR = \ln(OR)$$

These log odds ratios were finally converted into a standardized effect size called Cohen's *d**.

$$d = (LOR * \sqrt{3})/\pi$$

The absolute value of the effect size must be at least 0.2 to be considered meaningful. An effect size of 0.2 to 0.499 is "small," an effect size of 0.5 to 0.799 is "medium," and an effect size of 0.8 or greater is "large."

Additionally, each odds ratio was converted to a *z*-score:

$$z = LOR \Big/ \sqrt{\frac{1}{P_{MD}} + \frac{1}{F_{MD}} + \frac{1}{P_{DO}} + \frac{1}{F_{DO}}}; z = LOR \Big/ \sqrt{\frac{1}{P_{MDPhD}} + \frac{1}{F_{MDPhD}} + \frac{1}{P_{MD}} + \frac{1}{P_{MD}}}$$

The two-tailed probability of each *z*-score was calculated and tested; a *p*-value of 0.05 or below was statistically significant.

RESULTS

MD vs. DO: AP test results showed a statistically significantly higher pass rate for MD candidates over DO candidates throughout the 17-year period, but this can be attributed to the large sample size. The overall effect size between MD and DO candidates fell short of the 0.20 threshold for a "small" meaningful effect. Only two individual years showed a statistically significant advantage for MD holders with a medium effect. CP test results showed no significant or meaningful difference between MD and DO candidates throughout the 17-year period, and only one individual year with a statistically significant medium effect favoring MD holders.

MD vs. MD,PhD: AP test results showed a statistically significantly higher pass rate for MD,PhD candidates over MD candidates throughout the 17-year period, but this can be attributed to the large sample size. The overall effect size between MD and MD,PhD candidates fell short of the 0.20 threshold of a "small" meaningful effect. No individual years showed a statistically significant advantage for MD,PhD candidates. CP test results showed a statistically significant medium effect favoring MD,PhD candidates over MD candidates throughout the 17-year period. Every individual year from 2006 to 2020 showed a meaningful effect size favoring MD,PhD candidates, with four of those years showing a statistically significant medium-to-large effect.

DISCUSSION

The odds ratios for MD and DO candidates' pass rates from 2006 to 2022 showed that while MD candidates did have a slightly higher pass rate on the AP, the difference was not great enough to justify a meaningful effect favoring MD candidates on either Primary Certification Examination.

MD,PhD candidates were significantly and practically more likely to pass the CP Primary Certification Examination than MD candidates over the 17-year period. Considering that MD,PhD holders are more likely to work in clinical laboratories throughout their training than just MD holders, this may explain the medium overall effect. Only 2021 and 2022 showed no meaningful difference between MD and MD,PhD candidates on the CP. This change may reflect changes in educational content delivery during the COVID-19 pandemic.

* Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum

MD vs. DO - AP

Year	OR	LOR	Cohen's d	Effect	Favoring	z	P(z)
2006	1.941	0.663	0.366	Small	MD	1.719	0.086
2007	1.868	0.625	0.344	Small	MD	1.269	0.205
2008	1.127	0.119	0.066	-	-	0.186	0.853
2009	*3.879*	*1.356*	*0.747*	*Medium*	*MD*	*2.626*	*0.009*
2010	*2.498*	*0.916*	*0.505*	*Medium*	*MD*	*2.244*	*0.025*
2011	1.802	0.589	0.325	Small	MD	1.545	0.122
2012	0.861	-0.150	-0.082	-	-	-0.238	0.812
2013	1.189	0.173	0.095	-	-	0.342	0.732
2014	1.320	0.277	0.153	-	-	0.546	0.585
2015	0.384	-0.956	-0.527	Medium	DO	-1.284	0.199
2016	1.876	0.629	0.347	Small	MD	1.467	0.142
2017	1.516	0.416	0.229	Small	MD	0.719	0.472
2018	2.094	0.739	0.407	Small	MD	1.594	0.111
2019	1.278	0.245	0.135	-	-	0.550	0.582
2020	1.326	0.282	0.155	-	-	0.545	0.586
2021	1.799	0.587	0.324	Small	MD	1.439	0.150
2022	0.301	-1.200	-0.662	Medium	DO	-1.616	0.106
Overall	***1.365***	***0.311***	***0.172***	-	-	***2.731***	***0.006***

MD vs. DO – CP

Year	OR	LOR	Cohen's d	Effect	Favoring	z	P(z)
2006	0.834	-0.181	-0.100	-	-	-0.381	0.703
2007	0.723	-0.325	-0.179	-	-	-0.614	0.539
2008	2.306	0.836	0.461	Small	MD	1.708	0.088
2009	1.736	0.551	0.304	Small	MD	1.114	0.265
2010	*2.487*	*0.911*	*0.502*	*Medium*	*MD*	*2.178*	*0.029*
2011	1.998	0.692	0.382	Small	MD	1.663	0.096
2012	0.744	-0.296	-0.163	-	-	-0.393	0.695
2013	1.339	0.292	0.161	-	-	0.570	0.568
2014	0.585	-0.536	-0.296	Small	DO	-0.865	0.387
2015	0.767	-0.266	-0.147	-	-	-0.350	0.726
2016	0.602	-0.507	-0.279	Small	DO	-0.671	0.502
2017	1.669	0.512	0.282	Small	MD	0.765	0.444
2018	2.034	0.710	0.391	Small	MD	1.436	0.151
2019	0.650	-0.431	-0.238	Small	DO	-0.780	0.435
2020	1.504	0.408	0.225	Small	MD	0.775	0.438
2021	2.489	0.912	0.503	Medium	MD	1.541	0.123
2022	0.591	-0.526	-0.290	Small	DO	-0.495	0.620
Overall	**1.009**	**0.009**	**0.005**	-	-	**0.073**	**0.942**

MD,PhD vs. MD - AP

Year	OR	LOR	Cohen's d	Effect	Favoring	z	P(z)
2006	1.424	0.353	0.195	-	-	0.929	0.353
2007	1.499	0.405	0.223	Small	MD,PhD	0.819	0.413
2008	1.479	0.392	0.216	Small	MD,PhD	0.862	0.389
2009	1.348	0.299	0.165	-	-	0.603	0.546
2010	1.606	0.474	0.261	Small	MD,PhD	1.202	0.229
2011	1.264	0.234	0.129	-	-	0.716	0.474
2012	1.371	0.316	0.174	-	-	0.788	0.431
2013	1.110	0.104	0.057	-	-	0.270	0.787
2014	1.114	0.108	0.060	-	-	0.266	0.791
2015	1.565	0.448	0.247	Small	MD,PhD	1.165	0.244
2016	1.739	0.553	0.305	Small	MD,PhD	1.012	0.311
2017	1.692	0.526	0.290	Small	MD,PhD	0.825	0.409
2018	1.088	0.085	0.047	-	-	0.177	0.859
2019	1.021	0.021	0.011	-	-	0.053	0.958
2020	1.703	0.533	0.294	Small	MD,PhD	0.968	0.333
2021	1.052	0.051	0.028	-	-	0.141	0.888
2022	0.915	-0.089	-0.049	-	-	-0.223	0.824
Overall	***1.359***	***0.307***	***0.169***	-	-	***3.034***	***0.002***

MD,PhD vs. MD - CP

Year	OR	LOR	Cohen's d	Effect	Favoring	z	P(z)
2006	*3.767*	*1.326*	*0.731*	*Medium*	*MD,PhD*	*2.486*	*0.013*
2007	2.240	0.807	0.445	Small	MD,PhD	1.874	0.061
2008	*5.781*	*1.755*	*0.967*	*Large*	*MD,PhD*	*2.894*	*0.004*
2009	1.830	0.604	0.333	Small	MD,PhD	1.229	0.219
2010	1.513	0.414	0.228	Small	MD,PhD	0.845	0.398
2011	2.065	0.725	0.400	Small	MD,PhD	1.612	0.107
2012	3.337	1.205	0.664	Medium	MD,PhD	1.629	0.103
2013	*7.937*	*2.072*	*1.142*	*Large*	*MD,PhD*	*2.027*	*0.043*
2014	*4.853*	*1.579*	*0.871*	*Large*	*MD,PhD*	*2.152*	*0.031*
2015	2.459	0.900	0.496	Small	MD,PhD	1.446	0.148
2016	4.584	1.523	0.839	Large	MD,PhD	1.476	0.140
2017	3.352	1.210	0.667	Medium	MD,PhD	1.152	0.249
2018	5.396	1.686	0.929	Large	MD,PhD	1.632	0.103
2019	1.667	0.511	0.282	Small	MD,PhD	1.115	0.265
2020	5.091	1.627	0.897	Large	MD,PhD	1.576	0.115
2021	1.104	0.099	0.054	-	-	0.153	0.878
2022	1.297	0.260	0.143	-	-	0.331	0.741
Overall	***3.054***	***1.116***	***0.616***	***Medium***	***MD,PhD***	***7.650***	***0.000***