BRIEF

An Exploratory Analysis of PharmD Program Value Using the Tuition: Licensure Index

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Submitted March 28, 2019; accepted June 26, 2019; published March 2020.

Objective. To assess the value of a Doctor of Pharmacy (PharmD) program using the Tuition: Licensure Index (TLI), a *de novo* metric combining tuition and licensure pass rates.

Methods. The TLI is a ratio of program tuition and licensure pass rates, where separate indices are derived for the North American Pharmacist Licensure Examination or NAPLEX (ie, TLI-N) and the Multistate Pharmacy Jurisprudence Examination (ie, TLI-M). The TLI can be further nuanced depending on use of in-state (ie, TLI-N_i and TLI-M_i) or out-of-state (ie, TLI-N_o and TLI-M_o) tuition. The TLI-N for the 2018 cohort was used in this analysis. Total program tuition and NAPLEX pass rates were obtained from publicly available sources. Differences in traditional vs accelerated and public vs private programs were examined using the TLI-N categories “one or less” and “greater than one.”

Results. While differences in TLI-N_i category (ie, “one or less” and “greater than one”) for traditional vs accelerated PharmD programs were not significant, a major difference was found in the TLI-N_i category for public vs private programs. No differences in the TLI-N_o category for public vs private or for traditional vs accelerated programs were found.

Conclusion. In-state public (vs private) PharmD programs may be preferable for optimizing value. Prospective students are encouraged to consider a school’s tuition and licensure pass rates when selecting a PharmD program.

Keywords: pharmacy licensure, pharmacy education, program evaluation, educational measurement

INTRODUCTION

Pharmacy education in the United States has experienced unprecedented growth over the past several years. The number of Doctor of Pharmacy (PharmD) programs recognized by the Accreditation Council for Pharmacy Education (ACPE) has more than doubled since 1970, from 74¹ to 143 as of January 2019.² Likewise, the number of pharmacist graduates has risen apace, from 6956 in 1990¹ to 14,502 in 2017.² While the growth of new and existing PharmD programs has done much to address previously projected pharmacist manpower shortages, it is now recognized that market opportunity for both academic institutions and newly licensed practitioners has plateaued if not slightly declined nationwide,³⁻⁵ average PharmD program tuition has steadily increased disproportionate to pharmacist salaries,^{6,7} and pass rates for the North American Pharmacist Licensure Examination (NAPLEX) have progressively declined

since 2014.⁸ Given this unique climate, many in the profession now advocate for a temporary moratorium on new program accreditation.⁹ It therefore becomes essential that both prospective students and program leaders pay special attention to student tuition and successful pharmacist licensure, both of which are components of the program value index used in this analysis.

Practically, PharmD program assessment models can be said to inform the current conceptualization of quality. For example, ACPE evaluates PharmD programs based on a comprehensive 25-factor model (ie, Standards 2016),^{1,10} which includes both educational (eg, student knowledge and professional development) and programmatic (eg, curriculum, progression, financial resources) domains to produce practice- and team-ready graduates.¹⁰ These factors, of course, are assessed through numerous qualitative and quantitative metrics, including NAPLEX pass rates.^{10,11} Similar to “Standards 2016,”¹⁰ Mattingly and colleagues¹² propose the use of nine factors (and accompanying metrics), which include, in descending order of importance: postgraduate student placement, student success (eg, grades), testing, curriculum, stakeholder feedback, recruitment,

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scholarship and extramural funding, service activities, and operations. As the two models are very similar and are co-contemporary, both also presuppose the insufficiency of using a single summative metric for assessing PharmD program value.^{10,12}

The Tuition:Licensure Index (TLI), newly introduced in this paper, is a novel tool that combines program-specific tuition and licensure (ie, NAPLEX and MPJE) pass rate data for PharmD program valuation. The TLI does not attempt to challenge the presupposition undergirding existing models^{10,12}; instead, it is intended for use in the current assessment context. Though *de novo*, the TLI is not without some degree of controversy, much of which derives from the now-routine use of NAPLEX data as program outcomes.^{8,13-16} Popovich and colleagues¹⁷ have raised important concerns in this regard, echoing remarks from officials at the National Association of Boards of Pharmacy (NABP) that “licensure examinations were never intended to measure education or pinpoint specific weaknesses in teaching, curriculum, or the program in the college of pharmacy.”¹¹ Nevertheless, by requiring publication of licensure pass rates on program websites, ACPE clearly recognizes the importance of these metrics on program valuation.^{11,16,18} Thus, an important part of program value can be said to comprise, without being wholly defined by, the TLI. The question of this analysis, therefore, is this: considering publicly available data regarding program-specific tuition and licensure pass rates, can the value of accredited pharmacy programs be further quantified and assessed? This research evaluated traditional four-year vs accelerated three-year PharmD programs and public vs private PharmD programs according to the Tuition:Licensure Index.

METHODS

The TLI is a novel metric designed to evaluate individual PharmD programs in terms of tuition and fees (hereafter referred to as “tuition”) and NAPLEX and the Multistate Pharmacy Jurisprudence Examination (MPJE) pass rates. The TLI for each program can be calculated for both the NAPLEX and MPJE separately as:

$$TLI = \frac{\frac{\text{Individual PharmD Program Total Tuition}}{\text{Average Total Tuition for All PharmD Programs}}}{\frac{\text{Individual PharmD Program Licensure Pass Rate}}{\text{Average Licensure Pass Rate for All Programs}}}$$

In this equation, “licensure” can refer to either the NAPLEX (ie, TLI-N) or MPJE (ie, TLI-M) and “tuition” can refer to either in-state (ie, TLI-N_i and TLI-M_i) or out-of-state (ie, TLI-N_o and TLI-M_o) tuition. Programs with TLI values of one or less can be considered “good” in terms of program value (with smaller values corresponding

to increasingly “good” value), while those with values greater than one may be considered “less than good” (with larger values corresponding to increasingly “less than good” value).

This secondary analysis collected publicly available data from the American Association of Colleges of Pharmacy (AACP) website and the NABP website (ie, the units of observation) to characterize the value of PharmD programs. Data included traditional four-year, accelerated three-year, private, and public PharmD program classifications, tuition and fees (data obtained from the AACP), and NAPLEX pass rates associated with “all attempts” for each ACPE-accredited PharmD program for the 2018 graduating cohort (data obtained from the NABP). “All attempts” was considered the more conservative estimate compared to “first time attempts” because of the association of “all attempts” with comparatively higher pass percentages and larger administration numbers. Program pass rates for the MPJE were not included in this analysis.

Both descriptive and inferential analyses were conducted. Descriptive data included calculating mean, standard deviation, median, and minimum and maximum values for 2018 in-state and out-of-state tuition, NAPLEX pass rate, and TLI-N_i and TLI-N_o; and the 2018 TLI-N_i and TLI-N_o for each ACPE-accredited PharmD program. Inferential analyses comparing the TLI-N for traditional vs accelerated and public vs private PharmD program across categorizations (ie, frequency of institutions with TLI score of “one or less” and “greater than one”) were conducted using the chi-square test at an alpha significance level of 0.0125 (correcting for the potential for committing a Type I error resulting from multiple statistical testing). Where program-specific tuition data were not provided for a specific year within the 2018 graduating sequence (ie, the four years for traditional and three years for accelerated programs leading to 2018 graduation), program-specific averages corresponding to professional year (eg, P1, P2, P3, and P4) were calculated and used to approximate total program tuition for the 2018 cohort. Excel and SAS 9.4 for Windows (Cary, NC) were used for statistical analysis. All data were collected and analyzed by the author.

RESULTS

A total of 143 ACPE-accredited PharmD programs were initially identified via the AACP website. Nine of these programs were excluded from the study because their NAPLEX pass rates were not reported on the NABP website for the 2018 cohort. Thus, the number of programs included in the analysis was 134. As tuition data were not provided on the AACP website for nine of the

134 programs in the analysis (corresponding to 24 total time segments), average program-specific tuition corresponding to academic year (ie, P1, P2, P3, or P4) was calculated for each of the nine programs and used to estimate costs. No substantial changes were observed in TLI-N for five of the nine programs after imputation of average values; however, substantial changes were observed in the other four programs, with University of North Carolina Chapel Hill, Ohio Northern University, and Philadelphia College of Pharmacy showing 21% increases (on average) in TLI-N_i and TLI-N_o and West Coast University showing a 51% increase in TLI-N_i and TLI-N_o.

Descriptive statistics for the complete data set are presented in Table 1, with variations noted according to traditional vs accelerated and public vs private program categorizations. The TLI-N data for each of the 134 PharmD programs included in the study are presented in Table 2, with program structure (ie, four-year traditional, three-year accelerated), program type (ie, public vs private), in- and out-of-state tuition, and 2018 NAPLEX pass rates also provided. The results of chi-square analyses comparing traditional vs accelerated and public vs private program classifications according to TLI-N category (ie, TLI-N “one or less” and “greater than one”) are provided in Table 3. The results showed a significantly greater

Table 1. Descriptive Statistics Including the Tuition Licensure Index for Instate and Out-of-State Tuition for 2018 for Doctor of Pharmacy Programs in the United States (N=134)^a

PharmD Program Type	Mean	Standard Deviation	Median	Min	Max
Overall Data Set (n=134)					
In-State Tuition, \$ ^b	124,149.28	39,375.94	129,454	33,590	231,732
Out-of-State Tuition, \$	155,968.48	28,225.44	157,559.50	10,445	232,532
NAPLEX Pass Rate	0.8804	0.0828	0.9007	0.5843	1
TLI-N _i	1.0157	0.3562	1.0387	0.2452	1.9761
TLI-N _o	0.9864	0.1837	0.9994	0.0595	1.5179
Public (n=65)					
In-State Tuition, \$	93,825.76	27,972.23	90,675	33,590	231,732
Out-of-State Tuition, \$	159,136.02	31,917.40	165,963	10,445	232,532
NAPLEX Pass Rate	0.9084	0.0711	0.9211	0.5843	1
TLI-N _i	0.738	0.2427	0.6983	0.2452	1.9761
TLI-N _o	0.9734	0.1954	0.9983	0.0595	1.4706
Private (n=69)					
In-State Tuition, \$	152,714.91	24,272.67	151,279	80,845	218,952
Out-of-State Tuition, \$	152,984	24,099.43	151,279	80,845	218,952
NAPLEX Pass Rate	0.8539	0.0847	0.8529	0.65	1
TLI-N _i	1.2772	0.2226	1.2816	0.6757	1.9446
TLI-N _o	0.9986	0.1724	1	0.5274	1.5179
Traditional (n=121)					
In-State Tuition, \$	121,814.62	39,424.81	123,823	33,590	231,732
Out-of-State Tuition, \$	156,351.64	28,225.89	157,800	10,445	232,532
NAPLEX Pass Rate	0.8863	0.08	0.9054	0.5843	1
TLI-N _i	0.988	0.3489	0.9881	0.2452	1.9761
TLI-N _o	0.9816	0.1799	0.9960	0.0595	1.4706
Accelerated (n=13)					
Instate Tuition, \$	145,879.54	32,781.74	149,029	80,845	194,674
Out-of-State Tuition, \$	152,402.15	29,112.76	154,967	80,845	194,674
NAPLEX Pass Rate	0.8253	0.0907	0.827	0.6875	0.9585
TLI-N _i	1.2725	0.3317	1.3288	0.6757	1.9446
TLI-N _o	1.0314	0.2185	1.0372	0.5274	1.5179

Abbreviations: PharmD=Doctor of Pharmacy, TLI-N_i=Tuition Licensure Index for in-state, TLI-N_o=Tuition Licensure Index for out-of-state, NAPLEX= North American Pharmacist Licensure Examination

^a Although 143 accredited US Doctor of Pharmacy programs were initially identified via the American Association of Colleges of Pharmacy website, nine of these programs were excluded from the study because their NAPLEX pass rates were not reported on the National Association of Boards of Pharmacy website for the 2018 cohort. Thus, the number of programs included in the analysis was 134

^b In-state and out-of-state tuition costs are the average tuition cost expressed in US dollars

Table 2. Tuition, Pass Rates, and TLI-N Values for 2018 Cohort

Program			Tuition and Fees ^b		2018 NAPLEX		TLI-N _i	TLI-N _o
Name ^a	Structure	Type	In State	Out of State	Pass Rate	All Attempts		
A&M Schwartz	Traditional	Private	172460	174500	0.816	212	1.49874	1.18369
Albany	Traditional	Private	143534	143534	0.8777	229	1.15967	0.90519
Appalachian	Traditional	Private	112300	112300	0.7568	74	1.05227	0.82135
Arizona	Traditional	Public	100109	175115	0.8155	103	0.87051	1.18859
Arkansas	Traditional	Public	76787	144067	0.9402	117	0.57915	0.84816
Auburn	Traditional	Public	90836	171786	0.8766	154	0.73482	1.08472
Belmont	Traditional	Private	143450	143450	0.9385	65	1.08391	0.84605
Buffalo	Traditional	Public	109411	186191	0.9603	126	0.80794	1.07321
Butler	Traditional	Private	166642	166642	0.9921	127	1.19112	0.92974
California Health Sciences	Traditional	Private	176581	176581	0.7541	61	1.66051	1.29612
California Northstate	Traditional	Private	190015	190015	0.8293	123	1.62481	1.26826
California-SD	Traditional	Public	138027	187010	0.9697	66	1.00938	1.06748
California-SF	Traditional	Public	136405	185385	0.9060	117	1.06765	1.1326
Campbell	Traditional	Private	145535	145535	0.9565	115	1.07897	0.8422
Cedarville	Traditional	Private	129568	129568	0.9167	36	1.0023	0.78235
Chapman	Accelerated	Private	188530	188530	0.6875	80	1.94462	1.51788
Charleston	Traditional	Private	123492	123492	0.8261	69	1.06007	0.82744
Chicago State	Traditional	Public	107933	155238	0.5843	89	1.30992	1.4706
Cincinnati ^c	Traditional	Public	83787	141963	0.9091	99	0.65357	0.86436
Colorado ^c	Traditional	Public	115983	165963	0.9671	152	0.85045	0.94988
Concordia	Traditional	Private	135950	135950	0.8791	91	1.09665	0.856
Connecticut ^c	Traditional	Public	80674	177266	0.9263	95	0.6176	1.05927
Creighton	Traditional	Private	163733	163733	0.8919	185	1.30181	1.01613
Drake	Traditional	Private	156742	156742	0.9245	106	1.20228	0.93845
Duquesne	Traditional	Private	205032	205032	0.9239	184	1.57371	1.22837
D'Youville	Traditional	Private	129856	129856	0.7792	77	1.18179	0.92245
East Tennessee State	Traditional	Public	143688	143688	0.8171	82	1.24702	0.97337
Fairleigh Dickinson	Traditional	Private	151279	151279	0.8295	88	1.29327	1.00947
Ferris State	Traditional	Public	91460	123546	0.8042	143	0.80648	0.85035
Findlay	Traditional	Private	164321	164321	0.8772	57	1.32838	1.03687
Florida	Traditional	Public	96655	174456	0.9065	278	0.75611	1.06524
Florida A&M	Traditional	Public	40250	112309	0.7427	171	0.38431	0.83701
Georgia	Traditional	Public	80583	170955	0.9478	134	0.60291	0.99838
Hampton	Traditional	Private	131896	131896	0.6792	53	1.37709	1.07489
Harding	Traditional	Private	148379	148379	0.7736	53	1.36014	1.06166
Hawaii	Traditional	Public	91490	159722	0.8108	74	0.80018	1.09039
Houston	Traditional	Public	88519	157368	0.9746	118	0.64408	0.89376
Howard	Traditional	Private	130414	130414	0.8438	64	1.096	0.85549
Husson	Traditional	Private	136665	136695	0.907	43	1.06851	0.83421
Idaho State	Traditional	Public	80134	160393	0.9344	61	0.60815	0.95013
Illinois at Chicago ^c	Traditional	Public	121043	185087	0.8814	194	0.97385	1.16234
Incarnate Word	Traditional	Private	139095	139095	0.9545	88	1.03339	0.80662
Iowa	Traditional	Public	107931	194750	0.8860	114	0.86385	1.21668
Kansas	Traditional	Public	96308	174780	0.9928	138	0.6879	0.97445
Keck (KGI)	Traditional	Private	183506	183506	0.7581	62	1.71653	1.33985
Kentucky	Traditional	Public	108647	195577	0.9683	126	0.79567	1.11799
Lake Erie (LECOM)	Accelerated	Private	80845	80845	0.8485	297	0.67566	0.52739
Lebanese American	Traditional	Private	89427	89427	0.8	5	0.79269	0.61874
Lipscomb	Traditional	Private	162192	162192	0.9014	71	1.27597	0.99596
Loma Linda	Traditional	Private	176612	176612	0.9036	83	1.38602	1.08187
Louisiana at Monroe	Traditional	Public	94751	170659	0.9010	101	0.74574	1.04842

(Continued)

Table 2. (Continued)

Program			Tuition and Fees ^b		2018 NAPLEX		TLI-N _i	TLI-N _o
Name ^a	Structure	Type	In State	Out of State	Pass Rate	All Attempts		
Manchester	Traditional	Private	157800	157800	0.65	80	1.72155	1.34377
Marshall	Traditional	Public	76819	129944	0.7778	90	0.70037	0.92474
Maryland ^c	Traditional	Public	102351	168965	0.8411	151	0.86292	1.11194
Maryland Eastern Shore	Accelerated	Public	90675	175469	0.9455	55	0.68007	1.02724
MCPHS-Boston	Traditional	Private	152731	152731	0.7962	260	1.36029	1.06178
MCPHS-Worcester	Accelerated	Private	157751	157751	0.7673	318	1.45792	1.13799
Mercer	Traditional	Private	139177	139177	0.7701	174	1.28158	1.00035
Michigan	Traditional	Public	115160	180999	0.9494	79	0.86016	1.05526
Midwestern/D. Grove	Traditional	Private	165059	165349	0.8352	176	1.40144	1.09583
Midwestern/Glendale	Accelerated	Private	166715	166715	0.9301	143	1.27108	0.99215
Minnesota	Traditional	Public	123823	177241	0.9353	170	0.93881	1.04892
Mississippi	Traditional	Public	89619	185493	0.9528	106	0.667	1.0776
Missouri-KC	Traditional	Public	85463	181097	0.9103	145	0.66576	1.10118
Montana	Traditional	Public	44138	116106	0.8261	69	0.37888	0.77795
Nebraska	Traditional	Public	84364	163770	0.9815	54	0.60953	0.92358
New England	Traditional	Private	160255	160255	0.8529	102	1.33242	1.04003
New Mexico	Traditional	Public	83577	168458	0.8352	91	0.70962	1.11643
North Carolina	Traditional	Public	94408.3	192566	0.9565	161	0.69993	1.11436
North Dakota State	Traditional	Public	70658	174206	0.8696	92	0.57619	1.10885
North Texas	Traditional	Public	70587	135881	0.8675	83	0.57701	0.867
Northeast Ohio	Traditional	Public	97067	169855	0.9857	70	0.69832	0.95382
Northeastern	Traditional	Private	181516	181516	0.9609	128	1.33956	1.04561
Notre Dame	Traditional	Private	157152	157152	0.8519	54	1.30815	1.02109
Nova Southeastern	Traditional	Private	124408	140655	0.9004	241	0.97981	0.86467
Ohio Northern	Traditional	Private	139826	139826	0.9122	148	1.08699	0.84846
Ohio State	Traditional	Public	96019	188342	0.9576	118	0.71105	1.08866
Oklahoma	Traditional	Public	94237	176313	0.9125	80	0.73234	1.0695
Oregon State	Traditional	Public	100035	166431	0.9176	85	0.77308	1.00395
Pacific-CA	Accelerated	Private	194674	194674	0.9585	193	1.44027	1.12421
Pacific-OR	Accelerated	Private	136393	136393	0.8302	106	1.16503	0.90937
Palm Beach Atlantic	Traditional	Private	146925	146925	0.7875	80	1.32304	1.0327
PCOM-GA	Traditional	Private	146830	146830	0.8349	109	1.24712	0.97344
Philadelphia	Traditional	Private	184093	184093	0.9202	163	1.41867	1.10735
Pittsburgh	Traditional	Public	124232	138328	0.9068	118	0.97151	0.84436
Presbyterian	Traditional	Private	138256	138256	0.8333	78	1.17655	0.91836
Puerto Rico	Traditional	Public	33590	10445	0.9714	35	0.24521	0.05952
Purdue	Traditional	Public	90503	168108	0.8411	151	0.76303	1.1063
Regis	Traditional	Private	164712	164712	0.9853	68	1.18545	0.92531
Rhode Island	Traditional	Public	77944	141740	0.9365	126	0.5902	0.83775
Roosevelt	Accelerated	Private	149029	149029	0.8852	61	1.19387	0.93188
Rosalind Franklin	Traditional	Private	137572	137572	0.8088	68	1.20619	0.9415
Roseman	Accelerated	Private	154967	154967	0.827	237	1.3288	1.03721
Rutgers	Traditional	Public	77150	153112	0.8994	179	0.60829	0.9423
Saint Joseph	Accelerated	Private	141393	141393	0.7159	88	1.40056	1.09322
Samford	Traditional	Private	145697	145697	0.9060	117	1.14038	0.89013
Shenandoah	Traditional	Private	137540	137540	0.9136	81	1.06758	0.8333
South Carolina (COP)	Traditional	Public	73707	110061	0.9211	190	0.56745	0.66139
South Dakota State	Traditional	Public	77732	122899	1	76	0.55122	0.68027
South Florida ^d	Traditional	Public	231732	117672	0.8316	95	1.97605	0.78323
Southern California	Traditional	Private	218952	218952	0.9651	172	1.60881	1.25576
Southern Ill. Edwardsville	Traditional	Public	108367	128031	0.96	75	0.80048	0.7382

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Table 2. (Continued)

Name ^a	Program		Tuition and Fees ^b		2018 NAPLEX		TLI-N _i	TLI-N _o
	Structure	Type	In State	Out of State	Pass Rate	All Attempts		
South-GA	Accelerated	Private	130635	130635	0.8115	122	1.14156	0.89105
South-TN	Accelerated	Private	139700	139700	0.6952	105	1.425	1.11229
St. John Fisher	Traditional	Private	151935	151935	0.925	80	1.16478	0.90917
St. John's	Traditional	Private	179484	179484	0.8267	225	1.53959	1.20174
St. Louis COP	Traditional	Private	129340	129340	0.8596	235	1.067	0.83285
Sullivan	Accelerated	Private	165127	165127	0.8261	92	1.41747	1.10641
SW Oklahoma State	Traditional	Public	79454	147013	0.9231	52	0.61037	0.88153
Temple	Traditional	Public	130798	147596	0.8905	137	1.04158	0.91743
Tennessee ^c	Traditional	Public	90845	169595	0.9321	162	0.69114	1.00712
Texas A&M	Traditional	Public	54117	212865	0.8966	116	0.42802	1.31412
Texas at Austin	Traditional	Public	72804	188043	0.9649	114	0.53506	1.07871
Texas Southern	Traditional	Public	69118	110672	0.8661	112	0.56591	0.7073
Texas Tech	Traditional	Public	68181	126576	0.8741	143	0.55313	0.80153
Thomas Jefferson	Traditional	Private	163174	163174	1	62	1.15712	0.9032
Toledo	Traditional	Public	86615	129470	0.9785	93	0.62771	0.73238
Touro-CA	Traditional	Private	178065	178065	0.9783	92	1.29072	1.00748
Touro-NY	Traditional	Private	152060	152060	0.7742	62	1.3928	1.08716
Union	Traditional	Private	138115	138115	0.9455	55	1.03587	0.80856
Utah ^c	Traditional	Public	116713	232532	0.9608	51	0.86142	1.33962
Virginia Commonwealth ^d	Traditional	Public	113041	157974	0.9773	132	0.82023	0.89472
Washington	Traditional	Public	116972	202295	0.9881	84	0.83948	1.13322
Washington State ^c	Traditional	Public	83052	149668	0.916	131	0.64296	0.90441
Wayne State	Traditional	Public	84259	164671	0.9796	98	0.60995	0.93046
West Coast	Traditional	Private	166422	166422	0.6857	35	1.72109	1.34341
West Virginia	Traditional	Public	80649	161469	0.8824	85	0.64813	1.01287
Western	Traditional	Private	191370	191370	0.9766	128	1.38958	1.08465
Western New England	Traditional	Private	167580	167580	0.9054	74	1.31253	1.0245
Wilkes	Traditional	Private	146584	146584	0.8684	76	1.197	0.93432
Wingate	Traditional	Private	124188	124188	0.8913	92	0.98806	0.77124
Wisconsin-Madison	Traditional	Public	81817	144227	0.9836	122	0.58986	0.81163
Wyoming	Traditional	Public	74871	144369	0.9245	53	0.57429	0.86437
Xavier	Traditional	Private	136076	136076	0.7257	175	1.32969	1.0379

^a Program name abbreviations correspond to those used by the American Association of Colleges of Pharmacy Office of Institutional Research and Effectiveness

^b In United States (US) dollars

^c Programs that provide reduced tuition through mechanisms including (1) relaxed in-state residency requirements, (2) special regional rates, or (3) proof of health insurance. Special tuition reductions are not reflected in TLI-N calculations

^d Programs associated with increased fees for out-of-state students. These tuition increases are not reflected in in TLI-N calculations

proportion of public (vs private) programs with a TLI-N_i less than one ($\chi^2 = 93.63, p < .0001$).

DISCUSSION

The Tuition:Licensure Index represents a practical tool for estimating PharmD program value. While differences in TLI-N_i category (ie, “one or less” and “greater than one”) for traditional vs accelerated PharmD programs were not significant (Table 2), a major difference was found in TLI-N_i category for public vs private programs ($\chi^2 = 93.63, p < .0001$) (Table 2). In other words, significantly more public

PharmD programs are associated with a TLI-N_i of one or less, indicating, on a relative basis, that in-state public programs deliver better value than private programs in terms of tuition cost and a successful NAPLEX outcome. No differences in the frequencies of public vs private or traditional vs accelerated programs by TLI-N_o category were observed, which suggests that all out-of-state program types are of comparable value.

The current student debt crisis in the United States, now topping \$1.5 trillion,^{19,20} places considerable importance on the relationship between tuition and successful student outcomes, especially for pharmacy, where

Table 3. Chi-square Analyses of Traditional (four-year) versus Accelerated (three-year) and Public versus Private PharmD Programs by 2018 TLI-N Category

Program Type	n=134			n=133 ^a		
	TLI-N _i ≤ 1	TLI-N _i > 1		TLI-N _o ≤ 1	TLI-N _o > 1	
Traditional	61	60	$X^2 = 4.46$	61	59	$X^2 = 0.31$
Accelerated	2	11	$p = .0347$	5	8	$p = .5777$
Public	59	6	$X^2 = 93.63$	32	32	$X^2 = 0.01$
Private	4	65	$p < .0001$	34	35	$p = .9203$

^a Puerto Rico was excluded due to lack of data for out-of-state tuition

rising program costs and declining market opportunity now constitute the environment into which students transition upon graduation.³⁻⁷ While little empirical research is available regarding why students choose post-secondary educational programs in general²¹ or PharmD programs in particular, anecdotal evidence from the lay press suggests that tuition and corresponding program outcomes are infrequently considered.²²⁻²⁸ Prospective PharmD students should therefore be encouraged to examine program tuition in light of licensure pass rates and consider the importance of these criteria before choosing a program and incurring significant education-related debt. Hopefully, a renewed focus on tuition and successful student outcomes, particularly but not exclusively through use of the TLI-N, will enhance pharmacy market conditions by further empowering prospective students with the data necessary for informed decision-making.

The potential effect of three important variables on the TLI-N is unknown: student academic prowess, program leadership, and faculty qualifications. In other words, do students with greater academic prowess, as measured by grade point average (GPA) and Pharmacy College Admission Test (PCAT) scores, preferentially select in-state public pharmacy programs? Do distinctive characteristics exist regarding the leadership and faculty of programs associated with TLI-N values of one or less vs those of programs with values greater than one? In terms of academic prowess, average (composite) pre-pharmacy GPA and PCAT scores for the 2018 graduating cohort were not available for inclusion in this analysis. Kuncel and colleagues²⁹ used meta-analytic methods to suggest that PCAT scores and pre-pharmacy GPA values are positively correlated to NAPLEX scores. However, newer data, although limited by a single institution and pre-NAPLEX outcomes, are not strongly indicative of this relationship.³⁰ In terms of leadership and faculty qualifications, Popovich and colleagues¹⁷ and Brazeau³¹ suggest a link between leadership and program outcomes. Popovich and colleagues¹⁷ further contest that many programs rely on faculty and administrators with minimal

practice knowledge or academic experience to deliver core components of program curricula. However, aside from these reports and periodic, global (ie, non-program-specific) assessments of the educational credentials of leaders and faculty members, little is available in the professional literature linking leadership, faculty members, and program outcomes. Further study should examine TLI-N in light of student academic prowess, leadership qualifications, and faculty qualifications to better characterize PharmD program value.

Inputs used in this analysis may preclude a more precise estimation of program TLI. In terms of cost inputs, the author recognizes that sole use of tuition and fees can oversimplify costs of attending a pharmacy program, especially considering variations in cost of living, scholarship availability, and tuition assistance programs. Likewise, use of NAPLEX pass rates in TLI-N may limit a deeper, perhaps cleaner, conceptualization of value. For instance, while for most programs, “all attempts” rather than “first time attempts” are associated with higher pass rates, “all attempts” may not be representative of the performance of the 2018 graduating cohort. Second, use of average scores (continuous-level data), which are not publicly available, may be preferable to using pass rates (nominal-level data) because they may provide a clearer understanding of graduate performance. Finally, while the sole use of NAPLEX pass rates in the TLI-N may be questioned, this perceived limitation may also represent a strength, bringing into focus the fundamental concern of consumers and producers: value for money. The TLI is intended as an addition to the suite of accepted assessment metrics and not as a single, summative measure.

CONCLUSION

Data from the 2018 graduating cohort suggest that in-state public (rather than private) PharmD programs offer the better value in terms of tuition and licensure pass rates, with no differences found in the TLI-N for traditional vs accelerated (in-state and out-of-state) or public vs private (out-of-state) programs. For students who wish to attend

out-of-state programs, the choice of program does not appear to matter, ie, out-of-state tuition costs for public PharmD programs become comparable to private program tuition. Given current market conditions in pharmacy, prospective students are strongly encouraged to consider tuition and licensure pass rates when selecting a PharmD program.

ACKNOWLEDGMENTS

The author acknowledges the valuable assistance and feedback of Matthew Perri III, PhD, in the preparation of this manuscript.

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