



***U.S. News and World Report* and extramural funding rankings of United States pharmacy schools are predicted by their association with other types of professional schools**

Inder Sehgal, DVM PhD*¹

1. Marshall University School of Pharmacy, Department of Pharmaceutical Sciences and Research, One John Marshall Drive, Huntington WV, 25755

ABSTRACT

American universities with pharmacy schools often have at least one other doctoral health professional school; however, the frequency of these professional school pairings and the specific types of other doctoral programs most often associated with pharmacy schools is not reported. In addition, the potential influence of other doctoral schools on a pharmacy school's academic ranking is also unknown. This study determined if an institutional association with another type of medical school predicted either a U.S. pharmacy school's *US News and World Report* rank or its total research funding ranking according to the American Association of Colleges of Pharmacy. Pharmacy schools were grouped by association with no other professional program vs. any other professional program or with 0, 1 or more than 1 other programs. A relationship with ranking was modelled through fixed effects regression. Next, pharmacy schools were compared by their association with specific types of other schools. These analyses demonstrated that over one-half of universities with a pharmacy program also offer at least one other professional doctoral degree. The most common is a medical school granting an MD degree, followed by dental and then veterinary schools. Other schools, particularly the MD/DDS combination at the same university, predicted higher rankings for pharmacy schools. This study indicates that an association with specific types of other doctoral health programs correlates with higher peer rankings and greater extramural funding.

Keywords: DDS, DO, DVM, MD, professional schools, ranking, funding

*Corresponding Author Email Sehgali@Marshall.edu

Received 08 July 2014, Accepted 31 July 2014

INTRODUCTION

U.S. schools or colleges of pharmacy (S/COP) are often part of university health centers¹ suggesting that the S/COP may often be associated with at least one other professional doctoral-conferring school. Despite the apparent prevalence of other professional schools associated with S/COP, there has been no specific determination of how many pharmacy programs are associated with other professional schools, which types of other professional schools they are most associated with and how these associations may predict various achievement outcomes by the S/COP. Although some studies have included “Health Centers” in various variable stratifications, this label does not account for either the specific types or numbers of other professional schools or even if they offer a doctoral-level terminal degree in a medical field^{1, 2}. In this study, the objective was to understand if association with other medical degree schools and specific types of other medical schools could predict measures of academic success by a S/COP. Although, there can be no precise description of “academic success”, this study sought to define it by using both subjective and objective criteria. If the association with other types of doctoral colleges correlated well with both subjective and objective criteria, the conclusion would be that the influence of other professional degree programs is relevant to some measures of pharmacy school achievement. The most widely recognized subjective assessment of S/COP comes from the periodic U.S. News and World Reports magazine (USNWR) rankings while a widely utilized objective platform for comparison of pharmacy programs is funding from the National Institutes of Health (NIH) and/or other extramural sources^{1,3,4,5} thus these two rankings were used for comparisons.

As summarized recently by Schlesselman and Coleman¹ and Ascione⁶, USNWR rankings, though oft criticized, are read and regarded by potential students, employers and universities. They are also acknowledged by S/COP themselves as a benchmark for their own progression over time and in comparison to other S/COP⁶. Despite the subjective peer-rating of the rankings, USNWR S/COP ranks correlate with several objective criteria including funding, publications, years of establishment, student/faculty ratios and affiliation with an academic health center¹; these types of objective criteria likely feed into an overall subjective reputation for a school⁶. The presence of other professional doctoral programs could readily influence several of these objective criteria. For instance, funding may be facilitated by resources and collaborations at other professional schools. Funding is considered as a separate dependent variable in this study though with the acknowledgement that it is not “cleanly” separable from subjective rankings.

Pharmacy faculty publications are dependent on faculty time, collaboration in and outside of the S/COP and mentorship⁷; these determining factors in turn can be provided by the expertise of faculty at other university-associated doctoral schools and shared faculty can reduce student/faculty ratios. It is not an objective of this study to address putative methodologic flaws of USNWR but rather to acknowledge that despite its potential short-comings, USNWR remains the most accessible and widely recognized ranking of pharmacy programs in the US and in this study it is used as the measure of subjective, peer S/COP rank.

Funding levels are one objective measure of S/COP academic productivity^{1,3,4,5}. They can be affected by numerous characteristics including the university size and location, age, the school's mission, public-private status, and faculty numbers and resources^{1,5}. The presence or absence of one or more additional professional programs could conceivably alter these characteristics. This study was designed to understand if other health professional doctoral schools contribute to a S/COP's funding.

These analyses show the distribution and type of doctoral schools at universities with PharmD programs and demonstrate that university associations with these other doctoral programs predict both higher USNWR and funding rank at the pharmacy schools. Further, these data show that enhanced rankings are correlated with specific other types of doctoral schools.

MATERIALS AND METHODS

Data Sets

Data used included Accreditation Council for Pharmacy Education (ACPE) pharmacy programs in the United States. Several pharmacy schools have developed satellite branches and these branches were not considered as separate entities for analysis unless they were different by program length, tuition or institutional governance and had separate ranking by either the American Association of Colleges of Pharmacy (AACP) extramural funding data or USNWR. Total extramural funding for each pharmacy program was obtained from the most recent data set provided by the AACP, which reflected the 2012 fiscal year⁸. Excluded from this data set were recently launched pharmacy schools (in existence for 3 years or less prior to fiscal year of funding data). The total number of programs assessed with respect to funding ranking was 111. In 2012, USNWR ranked 87 pharmacy schools and listed 37 as "Rank Not Published (RNP)"⁹. Due to ties in the USNWR listings, ranked schools are enumerated 1-80. For analyses in this present study, S/COP which were RNP were not assessed in peer-ranking correlations. Of the USNWR listed programs, 2 were excluded from analyses in this study; one was a branch campus

of a now-integrated program and the other was a non-U.S. school. The total number of pharmacy schools assessed with respect to USNWR placement was 85. The National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System (IPED), was used to obtain data on professional doctoral degrees Doctor of Chiropractor (DC), Dentistry (DDS/DMD), Allopathic medicine (MD), Osteopathic medicine (OD), Doctor of Optometry (DO), Podiatric medicine (DPM) and/or Veterinary medicine (DVM) conferred by institutions which also grant the PharmD¹⁰. The total number of pharmacy schools that could be compared by presence or absence of other doctoral degrees was 130 (for data in Table 1). In some instances, these other professional schools shared the same campus as the pharmacy school, in other instances they are physically separated but are within the same university branch.

Statistical Analysis

The presence of other professional doctoral programs was considered to be an independent variable and schools were grouped binomially or ordinally to model potential relationships through fixed effects regression as performed in similar studies^{1, 11}. Total funding levels and USNWR rankings were both transformed to rank compared with all schools (Table 2). To compare the relative impact of specific types of professional schools on pharmacy funding or ranking, S/COP were grouped categorically with other professional schools, either singly or in combinations. USNWR and total funding ranks were compared using non-parametric comparisons (Kruskal-Wallis) and graphed as the mean and standard deviations (Figures 1 and 2). Only professional schools with greater than 5% presence at PharmD-granting universities with other health doctoral degrees were assessed. These included the MD, MD/DDS, DVM, and DO subgroups. A *p* value of ≤ 0.05 was considered significant for all analyses and analyses were performed using SPSS 21.0 (SPSS, Chicago, IL) or GraphPad Prism 6.0. In this study, new programs not ranked were therefore omitted from analysis.

RESULTS AND DISCUSSION

Just over one-half of universities with a pharmacy program also had at least one other professional doctoral program (Table 1). The most common other professional degree at these institutions was the M.D., which was offered at over one-third of pharmacy-holding institutions. Following the M.D. degree, a dental degree (DDS or DMD) was offered next most commonly. Other professional degrees were found at less than 10% of pharmacy-offering institutions. Of those institutions which offered the PharmD and at least two other professional degrees, the most common combination was the M.D. plus a dental degree which existed at 20.7% of PharmD universities.

Table 1. Types of Professional Doctoral Degrees Conferred at Universities with a Pharmacy Program (n=130).

Degree	% Pharmacy Programs with (number)
M.D.	36.2 (47)
D.D.S./D.M.D.	23.1 (30)
D.V.M.	9.2 (12)
D.O.	7.7 (10)
O.D.	3.8 (5)
D.P.M.	2.3 (3)
DC	0.8 (1)
with any Prof Dr	52.3 (68)
with 2 or more other Prof Dr	20 (26)

The most common professional doctoral degrees located within U.S. universities with an accredited pharmacy school are listed by the percentage of all pharmacy schools sharing a particular professional doctoral degree, any other professional doctoral degree(s) and those sharing the university with 2 or more other professional doctoral programs. Parenthesis show the total number of pharmacy schools sharing that particular doctoral degree. Abbreviation Prof Dr indicates “professional doctoral degree”.

When compared with pharmacy programs at universities with no other professional doctoral degrees, other professional degree-associated pharmacy schools showed increased mean USNWR rank as well as funding mean rank (Table 2). Both regressions indicated significant contribution of the variable “yes Prof Dr.” to the model. In order to test the relationship as a function of the number of other doctoral programs, a second model was constructed with pharmacy programs groups in 3 ordinal categories of no Prof Dr, 1 Prof Dr or > 1 Prof Dr. This model demonstrated a stronger coefficient of determination (R^2) between presence of other doctoral schools and both the pharmacy program’s USNWR ranking and funding.

Table 2. Relationship of university having another Professional Doctoral program to pharmacy school USNWR rank and funding.

Group	mean USNWR ranks ^a (n=85)	Best-fit slope (95% CI ^b)	R^2	Sig. ^c	mean funding ranks ^a (n=111)	Best-fit slope (95% CI ^b)	R^2
no ProfDr ^d	61.2±19.3	-29.1 (-38.4 to -19.8)	0.301	p<0.0001	70.0±22.4	-30.2 (-39.7 to -20.8)	0.270
yes ProfDr	32.1±23.1				40.9±27.5		
no ProfDr	61.2±19.2	-18.5 (-23.7 to -13.4)	0.369	P<0.0001	71.1±21.5	-20.0 (-25.3 to -14.6)	0.330
1 ProfDr	40.8±21.1				50.0±27.7		
2 or more ProfDr	24.3±22.3				31.0±23.3		

An independent variable group of the presence of other professional doctoral programs located at a university with a pharmacy school was plotted against the pharmacy program's USNWR ranking and AACP funding ranking. These data were first modelled through regression as either the absence (no ProfDr) or the presence (yes ProfDr) of other professional doctoral programs. Next, data were stratified into either the absence (no ProfDr), one other professional degree (1 Prof Dr) or 2 or more other professional degrees (2 or more ProfDr). Data depicts the mean ranking of those schools which received ranking, the slope of the outcome regression, the coefficient of determination (R^2) and the significance of the regression slope compared to the null hypothesis that the slope of 0.

^a mean \pm s.d.

^b confidence interval

^c significance

^d Professional doctoral programs

These results raised the question of whether one type of other professional school or a specific combination contributed more to increased ranking of the S/COP by either USNWR or by funding. To answer this question, the mean USNWR and funding ranks of pharmacy schools were compared by categories of the most common professional school pairings with pharmacy programs. These were S/COP associated with an MD program alone, both MD/DDS programs, a DVM program alone, and an osteopathic degree program alone. For USNWR ranking, this analysis showed an association with an MD + Dental school combination or with a veterinary school conferred the greatest benefit to the S/COP. The MD/DDS-associated S/COP was ranked significantly higher than those located with an MD or DO program alone (Figure 1A; $p < 0.05$). Since rankings assign a lower number to a higher rank, the higher ranked programs are positioned at a lower numerical position. Pharmacy schools associated with MD or DVM schools also were ranked higher in USNWR than pharmacy schools associated with osteopathic programs. For relationship with funding, the group of S/COP located with a DO ranked significantly lower than the other 3 groups which were not significantly different from each other. (Figure 1B; $p < 0.05$)

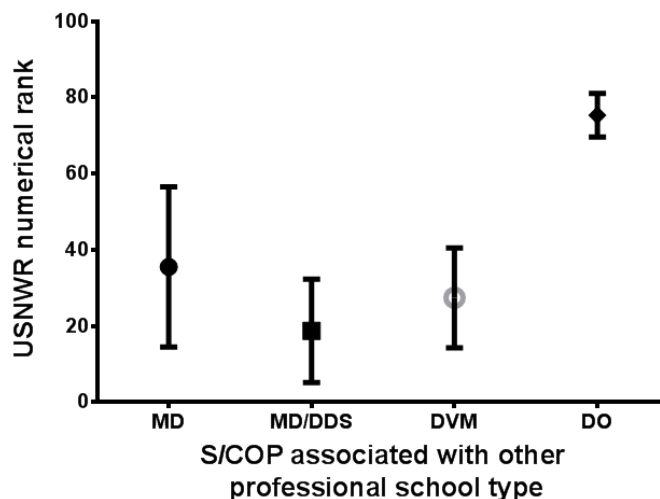


Figure 1A: The S/COP by USNWR.

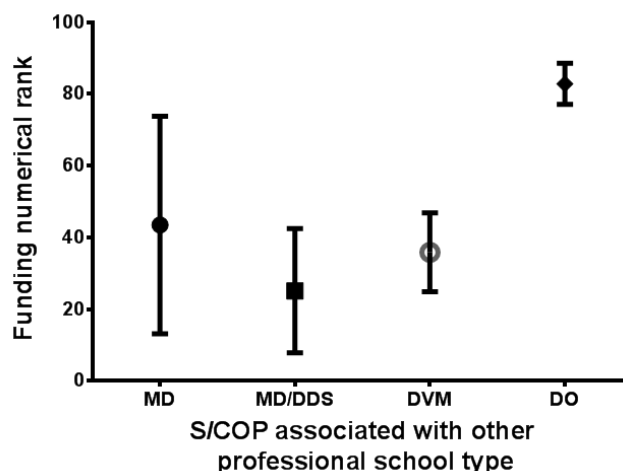


Figure 1B: The S/COP by funding.

Figure 1. Comparative rankings of U.S. S/COP when associated with other common doctoral health degree programs.

Data depicts the mean (symbol) and standard deviation (bars) for each category. The other doctoral schools included in this analysis are a subset of those that share a university with a S/COP and the university does not have additional doctoral schools, i.e., schools with only MD and pharmacy programs, schools with only MD, DDS and pharmacy programs, schools with only DVM and pharmacy programs and schools with only DO and pharmacy schools.

A. USNWR rankings of S/COP associated with listed other professional programs.

B. AACP funding rank of S/COP associated with listed other professional programs.

The existence of other university doctoral programs has the potential to influence several academic aspects of S/COP at the university; for instance, a recent study from this author has

shown that in private pharmacy schools, higher prerequisite standards for science courses and overall undergraduate hours correlate with the presence of additional professional doctoral degrees¹². The objectives of this study were to understand what specific other professional schools most frequently accompany a S/COP at the same university and assess the effect, if any, that these other professional schools have on a pharmacy school's subjective perception as determined by its USNWR peer ranking and by its more objective rank according to extramural funding levels. Over one-half of U.S. S/COP have at least one other doctoral school at the same university. The most common other school is an MD-granting medical program followed by a dental degree program, though the vast majority of dental schools were accompanied by a medical (MD) school. The most frequent combination of other professional schools at institutions which had a S/COP and at least two other professional schools was an MD and a DDS program.

A regression model developed with these data suggests that other professional schools do contribute to higher ranking in both USNWR and extramural funding at associated S/COP and that the model increases in strength when extended from an absence vs. presence binomial to a 3-tier ordinal model of 0, 1 or more than one other professional program.

Once the overall analysis indicated a strong relationship between one or more other doctoral programs and both subjective and objective rankings, a relevant follow-up was to determine if one type of other degree program stood out as predicting either USNWR or funding rankings. Pharmacy programs at universities holding MD and DDS schools had the highest ranked group means for both USNWR and funding ranks. However, this analysis was limited by the relatively small number and collinear nature of the variables i.e., universities with a S/COP and more than one other professional degree often had multiple other doctoral programs. Large numbers of MD-granting schools were affiliated with pharmacy-granting universities and separate from other programs, but the numbers of S/COP associated with DDS, DC, OD, or DPM programs were deemed too small to include in analysis. In addition, although the added influence of a dental school at institutions offering an MD significantly improved the mean rank of affiliated S/COPs, it is not possible to truly gauge the independent effect of dental programs since these schools could not be assessed independent of MD programs.

Relative rankings of S/COP with a DVM or DO program were assessed, and the association of a S/COP with a veterinary school predicted rankings as strong as those of S/COP associated with MD and MD/DDS combinations. This result suggests the power of veterinary-associated resources such as laboratory animal facilities, DVM-pathologists and perhaps shared teaching

faculty may translate into greater pharmacy school peer recognition and funding. However, these data should be cautiously interpreted. The number of veterinary and osteopathic school is far less than the number of S/COP, MD or DDS schools and therefore numbers of DVM- (5) and DO- (4) linked pharmacy schools was less than the MD or MD/DDS schools.

One limitation of this study was the inability to account for the actual physical distance between the pharmacy school and other university-associated doctoral school buildings. In some instances, these schools lie on different campuses and in these instances, the influence of one program on another would likely be weakened. To an extent, distant other professional schools would reduce the overall strength of the correlations measured in this study. Despite this limitation, analysis of all S/COP showed a significant and strong relationship with peer rank and funding success, suggesting that the correlations may have been even higher in the cohort of neighboring schools.

USNWR rankings of pharmacy and other health schools are based on a peer-assessment surveys distributed to pharmacy administrators¹³ and despite frequent criticism of the rankings methodology by school administrators, the USNWR are based on reputation and remain a popular and often-used comparison by professional programs^{1,6}. One explanation for the association between S/COPs with another professional school and their higher USNWR ranking is that, as demonstrated in this report, another professional degree program correlates with increased funding. Amount of funding received by S/COP is a powerful predictor of USNWR mean ranking¹.

Another explanation could be increased institutional recognition associated with medical schools, particularly those with highly regarded educational and residency programs. Finally, peer reviewers may recognize that co-localization with educators from other health schools expands the chances of interprofessional education (IPE) of the S/COP's students. IPE is fast becoming a valued part of medical education and has recently been embraced by the ACPE¹⁴. S/COP with potential to assemble collaborative teams integral to IPE may be perceived to provide some educational advantage.

The availability of one or more other professional schools within a university can enhance funding success of a S/COP by increasing collaborations, opening access to shared resources and perhaps by stimulating intra-programmatic competition. Successful grants and contracts often necessitate a broad array of expertise to design experiments, interpret results and carry out procedures. The natural collaborations that can develop between faculty at S/COP and other health science faculty would facilitate the compilation of these various expertise and conceivably

then increase the success of obtaining extramural dollars. Perhaps the greatest advantage of multiple professional programs is the increased level of resources so critical for funding success. For example, medical or veterinary schools are likely to have animal facilities and associated core facilities because they would be used by multiple investigators.

The high costs associated with maintaining these research facilities and equipment are spread out over larger numbers of faculty making possible the purchase and upgrade of modern equipment which can translate into increased scholarly productivity. The university research administration on campuses with multiple medical-related degree programs may be more accustomed to processing and administering extramural funds. A more subtle yet significant effect of sharing a campus with another professional school is the intra-programmatic competition which may naturally develop and push the pharmacy faculty to achieve funding on par with the other programs.

CONCLUSION

In general, many factors contribute to any rankings attributed to a S/COP during a given time period and no model can completely anticipate and assess all relevant independent variables. In this study, the goal was limited to determining only the possible relevance of another professional school or schools at the pharmacy school's university. These analyses demonstrate that having a university association with other professional schools does contribute to higher S/COP subjective and objective rankings and that associations with more than one other professional program, especially an MD and a DDS, predict higher rankings than associations with just one professional school.

ACKNOWLEDGEMENTS:

MUSOP for supporting charges associated with this publication.

ABBREVIATIONS:

AACP	American Association of Colleges of Pharmacy
ANOVA	Analysis of variance
ProfDr	Other Professional Doctoral degree schools
S/COP	School or College of Pharmacy
USNWR	U.S. News and World Reports rankings

REFERENCES

1. Schlesselman L, Coleman CI. College and School of Pharmacy Characteristics Associated with US News and World Report Rankings. Am J Pharm Educ. 2013; 77(3):

- Article 55.
2. Knapp DA, Knapp DE. Attributes of Colleges and Schools of Pharmacy in the United States. *Am J Pharm Educ.* 2009; 73(5): Article 96.
 3. Thompson DF, Nahata MC. Pharmaceutical Science Faculty Publication Records at Research-Intensive Pharmacy College and Schools. *Am J Pharm Educ.* 2012; 76(9): Article 173.
 4. Thompson DF, Sharp RP. Ranking of US pharmacy schools based on perception, funding, and publications. *Ann Pharmacother.* 2002; 36(9): 1477-1478.
 5. Benavides S, Garcia AS, Caballero J. The Impact of Student-Faculty Ratio on Pharmacy Faculty Scholarship. *Am J Pharm Educ.* 2010; 74(8): Article 138.
 6. Ascione FJ. Viewpoints In Pursuit of Prestige: the Folly of the US News and World Report Survey. *Am J Pharm Educ.* 2012; 76(6): Article 103.
 7. Morris CT, Hatton RC, Kimberlin CL. Factors associated with the Publication of Scholarly Articles by Pharmacists. *Am J Health-Syst Pharm.* 2011; 68(17): 1640-1645.
 8. American Association of Colleges of Pharmacy. Fiscal Year 2012 Faculty Research Grant Institutional Rankings. Available: <http://www.aacp.org/resources/research/institutionalresearch/Pages/InstitutionalRankingofFacultyResearchGrants.aspx>. Accessed May 20, 2014.
 9. US News and World Reports Best Grad Schools Rankings, Pharmacy. US News and World Reports web site. Available: <http://grad-schools.usnews.rankingsandreviews.com/best-graduate-schools/top-health-schools/pharmacy-rankings>. Accessed May 20, 2014.
 10. National Center for Education Statistics Integrated Postsecondary education data system. Available: <http://nces.ed.gov/ipeds/datacenter/>. Accessed March 2, 2014.
 11. Chisholm MA, Cobb HH, Kotzan JA. Significant factors for predicting academic success of first-year pharmacy students. *Am J Pharm Educ.* 1995; 59:364-370.
 12. Sehgal I. Identification of U.S. Pharmacy School Characteristics That Correlate with Pre-requisite Rigor. *Curr Pharm Teach Learn.* 2014 6(6);
 13. Morse R, Flanigan S. Methodology: Best Health Schools Rankings. Find out how U.S. News ranks graduate health programs. US News and World Reports web site. Available: <http://www.usnews.com/education/best-graduate-schools/articles/2013/03/11/methodology-best-health-schools-rankings>. Accessed April 10, 2014.

14. Ratka A. Transition of Pharmacy Educators to Faculty Champions of Inter professional Education. Am J Pharm Educ. 2013; 77(7): Article 136.



AJPHR is
Peer-reviewed
monthly
Rapid publication
Submit your next manuscript at
editor@ajphr.com / editor.ajphr@gmail.com