

## LETTER

### Response to Student and School-level Predictors of Pharmacy Residency Attainment

*To the Editor:* We thank Elnaz Arabian and Dr. Bryan McCarthy Jr. for their comments in response to our manuscript,<sup>1</sup> which help further the discourse about pharmacy residency attainment. In their letter, they noted that our study filled a critical gap in the literature by building a predictive model for pharmacy residency attainment by analyzing pharmacy student data from the American Association of Colleges of Pharmacy (AACP) Graduating Student Survey and Degrees Conferred Survey. After reading their letter, we realized we were remiss in not mentioning that the dynamics of who is applying for and attaining residency can change as competition rises for residency programs. Based on their comments, we would like to further frame how our study relates to previous literature and expand upon a research agenda for exploring pharmacy residency predictors.

The authors noted that Phillips and colleagues investigated pharmacy residency attainment predictors during the same timeframe but found that institutional work experience was a non-significant factor;<sup>2</sup> whereas, it was a significant factor and had the largest effect size in our study. Based on our study design, Arabian and McCarthy argued that our findings more strongly supported institutional pharmacy work experience as a predictor of residency attainment. Specifically, our study included a larger sample of students (577 vs 24,351) and schools (5 vs 101) and our statistical model, a logistic multilevel model, controlled for students nested within pharmacy schools along with various factors such as age, gender, and school age.

While both studies examined the increasingly important topic of residency attainment, readers should be cautious about comparing the results of these two studies given differences in study design, sampling, and statistical techniques. Findings from Phillips and colleagues may be different than ours for various reasons, including sampling, selection bias, or their smaller sample size. In addition, Phillips and colleagues ran three models with varying outcomes (eg, interview to attainment), all of which were different than our model of fourth-year students and residency attainment. Differences in our study results also could be attributed to the fact that institutional work experience may influence students applying

for residency, yet may not be an advantage during the application process. Taken together, we believe the two studies raise interesting and important questions about institutional work experience for future researchers to explore.

We agree with Arabian and McCarthy that further research should investigate the role of gender in residency attainment. Female gender had an odds ratio of 1:5 in our study and was a significant factor in two of Phillips and colleagues' models. It is possible that female students' greater likelihood of attaining residency is mediated through other factors, such as higher GPAs, more leadership positions, or research experiences; however, these relationships have not yet been examined by researchers. Alternatively, the finding may be due to motivational factors. In studies of gender effects on educational attainment, researchers stress the importance of gender differences in competence perceptions and values.<sup>3,4</sup> How confident a student feels he or she will perform in a certain domain tends to follow gender norms and stereotypes.<sup>3</sup> One way these gender norms are communicated to students is through model similarity.<sup>5</sup> If students observe that females are successful in careers requiring residency, and males are successful in careers that don't require residency, students may subconsciously internalize what is socially appropriate and form personal outcome expectations around these observations. Investigating whether these mechanisms hold true in pharmacy residency attainment could provide critical insight into these apparent gender effects.

In addition to research on gender and institutional work experience, future researchers should continue to explore other student- and school-level factors that may influence residency attainment. Examining why people make certain choices – for example, why a student selects a certain residency and why a search committee selects certain applicants – could be a critical step in understanding this professional pathway better. Therefore, the field also could benefit from deep dive qualitative research characterizing personal, social, and cultural factors in these decisions. In addition, the academy could benefit from access to and analysis of variables describing students at the point of admission, graduation, post-graduate application, and post-graduate attainment. Better understanding these key milestones in student progression could position pharmacy educators to explicate important patterns of student achievement.

Overall, we encourage researchers to further examine possible factors associated with residency application and attainment as this becomes an increasingly common and competitive professional pathway. Research that explicitly addresses the effects of gender

and work experience in pharmacy student progression could be an important contribution to the academy. More broadly, we hope pharmacy educators continue to develop and implement rigorous research methodologies that enable us to address the most pressing questions of today.

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