

BACKGROUND

- First time passing rates are a key quality indicator for pharmacy schools.
- Data provided by the American Association of Colleges of Pharmacy and National Association of Boards of Pharmacy have shown noticeable declines in North American Pharmacist Licensure Examination (NAPLEX) and Multistate Jurisprudence Examination (MJPE) first-time pass rates for several years (Figure 1, Figure 2).

Figure 1. NAPLEX First-Time Pass Rate 2018-2023

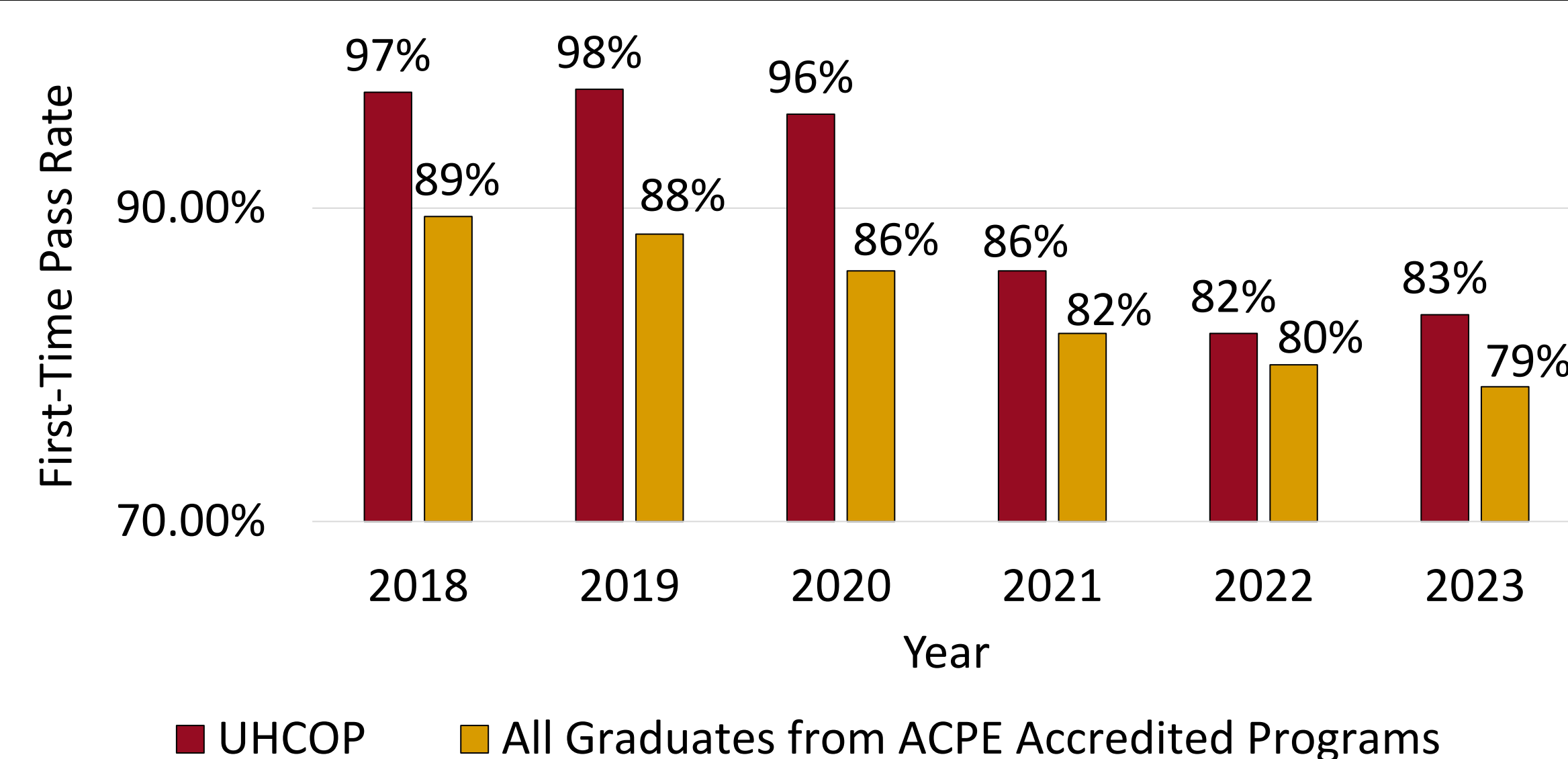
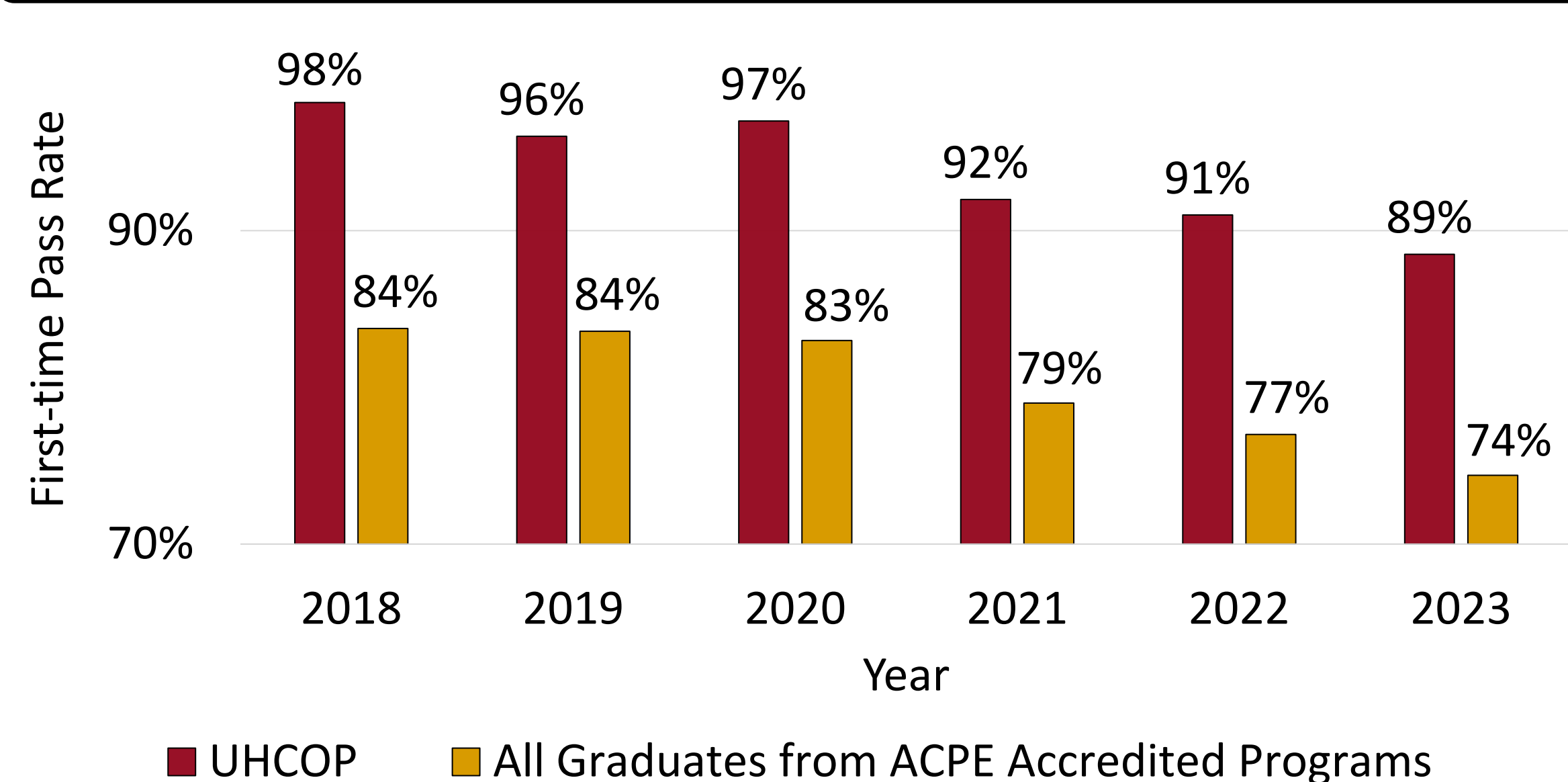


Figure 2. MJPE First-Time Pass Rate 2018-2023



- Key contributors to of the downward trend are not fully elucidated.
- The University of Houston College of Pharmacy (UHCOP) administers one internal comprehensive exam for fourth year pharmacy students to gauge understanding of material and preparation for licensure (Table 1). The utility of advanced pharmacy practice experience (APPE) exam performance has not been evaluated in relation to pharmacist licensure success.
- We hypothesize that a relationship exists between APPE exam scores and first-time pharmacist licensure exam pass rates.

Table 1. APPE Exam Content

APPE Exam Sections	Topic Areas
Advanced Community	<ul style="list-style-type: none"> • Calculations • Community pharmacy law • Errors and omissions • Non-prescription drug knowledge • Practice management • Prescription drug knowledge • Self-care pharmacotherapy
Advanced Hospital	<ul style="list-style-type: none"> • Calculations • Disease state management • Errors and omissions • Hospital pharmacy law • Pharmacy operations • Prescription drug knowledge
Internal Medicine	<ul style="list-style-type: none"> • Calculations • Disease state management • Interpretation of laboratory data • Non-prescription drug knowledge • Prescription drug knowledge

OBJECTIVE

- Our aim is to assess the correlation between numerical scores on APPE exams and first-time pass rates for pharmacist licensure exams.

METHODS

Study design / Inclusion

- We conducted a single center retrospective observational analysis.
- Inclusion:
 - Age ≥ 18 years
 - Student pharmacists enrolled in the required advanced pharmacy practice experiences between May 2020 through November 2022

Data Collection

- Researchers analyzed APPE examination results and licensure information from publicly available data on the Texas State Board of Pharmacy (TSBP)
- Successful first-time pass rates were measured using the TSBP intern and pharmacist license database (Table 2).

Table 2. Data Collection of Licensure Status

Status	Intern License (within 6 months after graduation)
At graduation	Active
No attempt	Active*
Pass on first attempt	Active
Fail on first attempt	Expired*
Pass on subsequent attempts	Expired

*Some graduates may not have tested or could be licensed outside of Texas

Statistical analysis

- Correlation between exam scores and probability of successful licensure was assessed using logistic regression
- A classification and regression tree analysis identified the most significant exam score threshold
- Predictive ability of the best-fit model was prospectively validated using the 2023 graduates cohort.

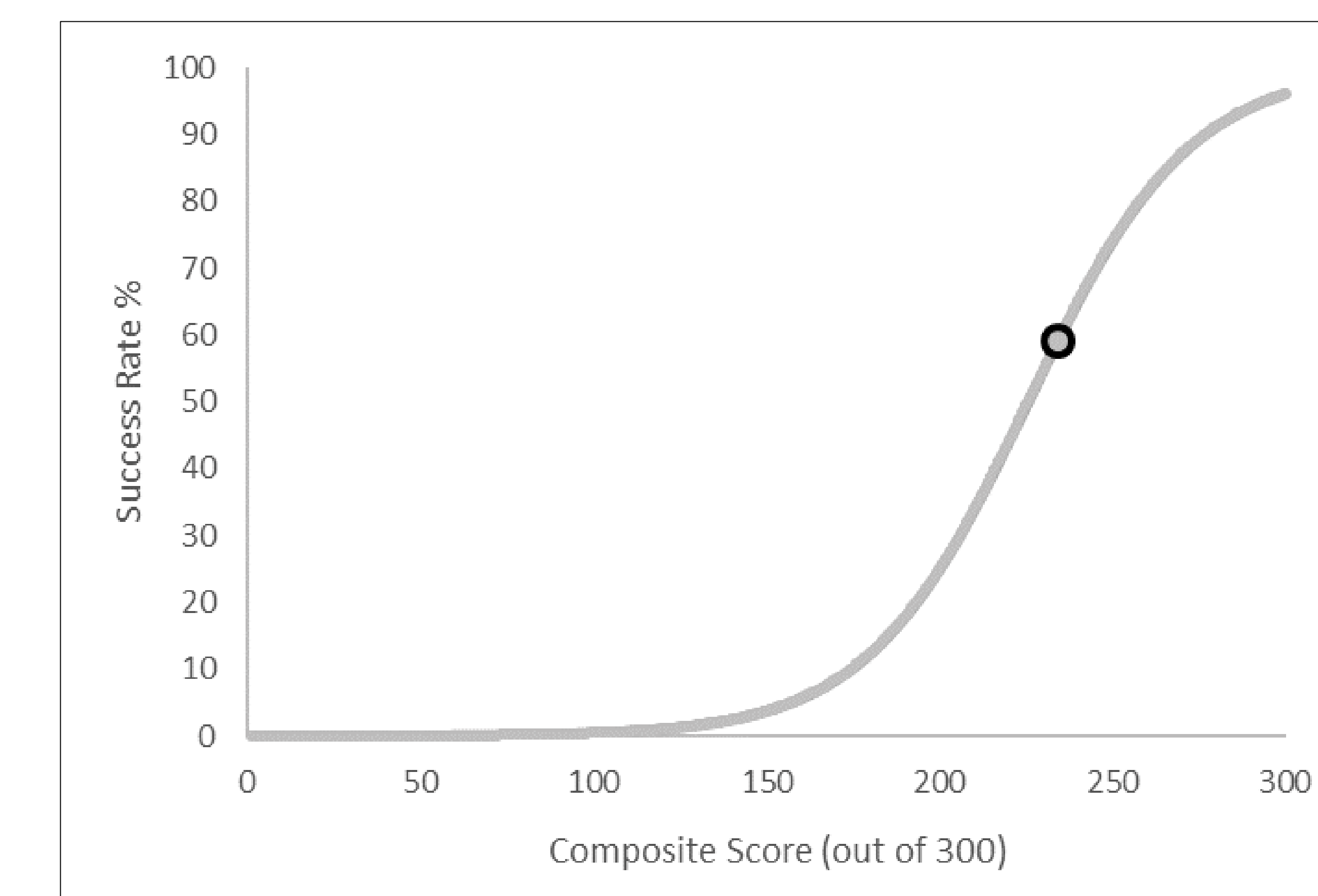
RESULTS

- 367 students were identified, 295 were included in the analysis.
- The study cohort had 206 students and the validation cohort had 89 students.
- Overall licensure success rate were 80.6% for the study cohort (2021-2022, n=206).
- APPE exams were assessed individually (Table 3) and in aggregate.
- The most significant threshold was 77.8% in aggregate (Figure 3). The success rate was 82.5% vs. 16.7% for those scoring above and below the threshold.
- The observed and predicted licensure success rates were 91.0% and 88.8% in the validation cohort (2023, n=89). The positive and negative prediction values were 94.9% and 40.0%.

Table 3. Correlation of Individual APPE Exam Performance with Successful Licensure

Exam Section	Odds ratio	Lower 95% CI	Upper 95% CI	P value
Advanced Community	1.062	1.011	1.116	.02
Advanced Hospital	1.076	1.019	1.136	.01
Internal Medicine	1.086	1.034	1.141	.001

Figure 3. Relationship Between Composite Exam Score and the Likelihood of Licensure Exam Success Rate



Note: $Success\ Rate = \frac{1}{1 + e^{-(0.043 \cdot Score) - 9.696}}$

The black circle depicts the most significant threshold cutoff identified (77.8%, 233.4 out of 300).

CONCLUSIONS

- APPE exams were a reasonable predictor of first-time licensure success for a graduating class.
- APPE exams are a promising risk stratification tool for students who may need additional resources for successful licensure.
- Further research in APPE assessment is warranted.