WHAT WORKS? A BIG DATA ANALYSIS OF THE EFFECTIVENESS OF COMLEX LEVEL 1 STUDY TOOLS
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Background
Performance on COMLEX USA Level 1 is the most important factor used by residency selection committees to evaluate prospective osteopathic residents. Efforts to determine the value of study tools and techniques for the COMLEX Level 1 examination have provided mixed results, yet osteopathic medical students continue to spend a great deal of time and money on these tools—often estimate an average of 17,760 on board examination materials over the course of their medical school careers. The pressure to perform well increases not only the cost of medical education but also the risk of making mistakes in study planning or study tool choice.

Multiple studies have shown that factors such as MCAT performance, undergrad GPA, and medical school GPA have a strong impact on COMLEX performance; however, research demonstrating the impact of specific exam preparation resources on examination outcomes is limited in number and scope. Knowing which tools and strategies produce the strongest impact on examination outcomes will be of great benefit to thousands of medical students and the osteopathic schools that they attend.

The goal of this study is to provide some guidance to students and to those who advise them about the relative value of various study tools and preparation habits. A large data set of course grades and other predictors, as well as a survey on study tool use, provided a unique opportunity to assess the effectiveness of a wide range of tools and to accomplish this goal.

Methods
236 eligible ACOM students in the class of 2019 were invited to complete an online survey after completing COMLEX Level 1, and 136 responded. Students were given a list of 82 resources used, divided into preparation time spent, while active, and while preparing for the examination. Students were also asked to rate the helpfulness of these resources on a 7-point Likert scale. These resources were divided into the following categories: study guides, books, online courses, and other tools.

Results and Discussion
Table 1: COMLEX Level 1 resources studied

<table>
<thead>
<tr>
<th>Resource</th>
<th>Questionnaire (n=136)</th>
<th>Online and research-based (n=136)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP Step 1 and License Test (42)</td>
<td>Andrew vs USMLE Step 1 Bank (38)</td>
<td>COMBINED: COMLEX Level 1 (136)</td>
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<tr>
<td>Lucero Williams with High Yield Companion COMLEX Step 1 Review (84)</td>
<td>COMBINED: COMLEX Level 1 (136)</td>
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<td>Andrew vs USMLE Step 1 Bank (38)</td>
<td>CONCORD: COMLEX Level 1 (136)</td>
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Figure 1: Correlations of prepared resource patterns and COMLEX Level 1 percentile rank. Of the resource use patterns studied, 19 were weakly correlated (p < 0.93) and 3 were modestly correlated (p = 0.41) with COMLEX Level 1 outcomes. The most significant positive predictors include completion of more than 50% of the UPStep 1 Lecat 1 question bank (p = 0.45), reading the USMLE RATIONALE book at least “Not too helpful” (p = 0.31), using the NIMBL USMLE Self-Assessment, and finding the NIMBL Self-Assessment at least “Somewhat helpful” (p = 0.39). The most significant negative predictor (i.e., “predictive of poorer performance”) is using “Targeted” more often than “Random” study mode when utilizing online question banks (p = 0.41). Error bars represent the 95% confidence interval.

Figure 4: Identification of independent predictors using stepwise linear regression of predictor categories (ad) and COMLEX Level 1 percentile rank (positive predictors black, negative predictors red). A regression of all significant predictors (n=39) explained 10% of the variability in the predicted COMLEX Level 1 percentile rank (R^2 = 0.10). A regression of all resource use predictors (n=18) explained 30% of the variability in the predicted COMLEX Level 1 percentile rank (R^2 = 0.30). A regression of all resource use predictors (n=18) explained 30% of the variability in the predicted COMLEX Level 1 percentile rank (R^2 = 0.30).

Conclusions
This study was an effort to quantify the impact of specific study resource habits and tools on COMLEX performance. Unlike similar studies, we were able to demonstrate clear associations between a subset of the resources students used, the COMLEX Level 1 percentile rank, and the students’ medical school background. Some of these include use of UpNotes or UpMC question banks, use of the NIMBL USMLE self-assessment tools, use of targeted Question bank study modes, and completing the examination within a time limit. Future research could explore the impact of these findings, including follow-up studies, surveys, and interviews with students and institutions. The addition of data from other institutions, including the use of online question banks, and the impact on student demographics, would be valuable.