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Pre-Residency Research Productivity of Matched OB/GYN Residents Before and After the USMLE Step 1 Transition

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Abstract

Objective(s): To assess the influence of the USMLE Step 1 transition on research productivity during the pre-residency period of matched obstetrics and gynecology residents.

Design: Retrospective cohort study comparing research productivity between residents who matched before the Step 1 transitioned from graded to pass/fail (class of 2026) and after it (class of 2028). PubMed-indexed publications were analyzed for count, authorship, specialty relevance, citation rate, and type. Mann-Whitney U tests were used to compare group differences, with total publications as the primary outcome.

Setting: Top 50 obstetrics and gynecology residency programs in the United States, according to Doximity.

Population: A total of 650 matched obstetrics and gynecology residents were included (n=323 from the class of 2026 and n=327 from the class of 2028). Residents with MD/PhD degrees were excluded.

Results: Residents in the post-Step 1 transition cohort produced a higher mean number of total publications (1.67±2.68 *vs.* 1.07±1.73, p=0.001), in-specialty publications (0.47±1.06 *vs.* 0.79±1.64), and first-author publications (0.51±0.94 *vs.* 0.32±0.71, p=0.005) compared to the pre-transition cohort.

Conclusion(s): The Step 1 transition from graded to pass/fail coincided with a statistically significant increase in pre-residency research productivity of matched obstetrics and gynecology residents. Residents from higher NIH-funded medical schools had significantly more publications than those from lower-funded schools. These findings highlight the need for residency programs to interpret research productivity within the context of available resources and evolving applicant pressures in the post–Step 1 scoring era.

Keywords: USMLE Step 1; Research Productivity; Residency Application; OB/GYN Residency; Pass/Fail Transition

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Introduction

The United States Medical Licensing Examination (USMLE) Step 1 exam score used to be one of the defining elements in a residency application and even used for determination of specialty and selection in programs. The transition of USMLE Step 1 exam from numerical scoring to pass/fail scoring has increased the emphasis on USMLE Step 2 scores, clinical performance on sub-internships and clerkships, extracurriculars, and overall research productivity [1, 2].

One of the important extracurricular productivity criteria is research productivity for medical students seeking to match into competitive residency programs [3]. Research experiences are highly valued because they demonstrate intellectual curiosity, problem solving skills, and self-directed and motivated learning abilities [3]. The transition of the USMLE Step 1 exam to pass/fail scoring may have heightened the importance of pre-residency research productivity within obstetrics and gynecology, mirroring trends observed in other specialties like urology [4, 5] and neurosurgery [6]. Previous literature on obstetrics and gynecology residency applicants has examined temporal

competitiveness, but not in relation to research productivity or the transition of Step 1 to pass/fail scoring [7]. This gap offers a unique opportunity to assess how systemic changes, like the Step 1 transition, have impacted research productivity in obstetrics and gynecology.

With increasing emphasis on research output medical students may face challenges tied to limited NIH funding and high publication fees. Institutions with strong NIH support can provide stronger research opportunities, mentorship, and resources, which can influence their research output as compared to students at schools with fewer funding resources [8-10].

The primary goal of this study is to assess the impact of the USMLE Step 1 pass/fail transition on the pre-residency research productivity of matched obstetrics and gynecology residents. The secondary objective of the study is to evaluate how medical school NIH funding may serve as barriers to research productivity. This work is particularly relevant for obstetrics and gynecology program directors, faculty, and senior medical students who face increasing pressure regarding the quantity and quality of research necessary for competitive residency applications.

Materials and Methods

Residency programs were selected from the Doximity Residency Navigator under the "Obstetrics and Gynecology" category, with rankings based on "Reputation" [11]. Doximity rankings were chosen because they have been used in prior studies with similar objectives [5, 6]. The top fifty eligible programs were selected. Only programs that provided publicly available information on full names and degree types (MD, DO, or MD/PhD) were included. Programs that did not meet these criteria were excluded, and the next qualifying program on the Doximity list was chosen. This study did not require Institutional Review Board (IRB) approval as all data were obtained from publicly available sources.

Resident selection

Residents from the 2026 and 2028 graduating classes were selected to represent groups immediately before and after the transition of USMLE Step 1 to a pass/fail format in January 2022. Since most U.S. MD students complete Step 1 at the end of their second year, those in the class of 2026 likely took the exam in summer 2020 or earlier, receiving a numerical score. In contrast, students in the class of 2028 are presumed to have taken the exam in summer 2022, under the pass/fail system. MD/PhD residents were excluded from analysis due to their typically elevated research output resulting from their formal PhD training.

Pre-Residency research output collection

For each resident, total publications, first-author contributions, and in-specialty publications were identified by searching PubMed using each resident's full name and affiliated medical school. Search results were filtered by the residency start date (≤ May 2022 for the class of 2026 and ≤ May 2024 for the class of 2028). Only PubMed-indexed publications were included to ensure consistent indexing standards and better accessibility compared to other sources, such as conference abstracts or non-indexed presentations [9]. Obstetrics and Gynecology-related publications were classified manually based on the article titles, journal, and content. For each publication, citation counts were collected and adjusted for the time since publication to calculate citation rates. Articles were then grouped into three categories for analysis: Original Research (e.g., clinical studies, primary investigations), Review Articles (including narrative, systematic, and meta-analyses), and Case Reports. Items such as preprints, editorials, corrections, commentaries, and letters were excluded to focus on peer-reviewed, substantive academic work.

Medical school NIH funding level classification

The NIH funding level of each resident's medical school was determined using the Blue Ridge Institute for Medical Research's (BRIMR) annual ranking of U.S. medical schools. The 2024 BRIMR rankings included 144 U.S. MD-granting institutions. Medical schools were grouped into NIH funding tiers based on their rank: the top third (1^{st}-48^{th}) were categorized as "Top NIH-Funded," the middle third (49^{th}-96^{th}) as "Middle NIH-Funded," and the bottom third (97^{th}-144^{th}) as "Bottom NIH-Funded." Each resident's medical school was assigned to an NIH funding tier accordingly. Schools not listed in the BRIMR rankings were classified as "No Info on NIH Funding" and were not included in the analysis.

Statistical analyses

Descriptive statistics were used to summarize resident characteristics, residency program tiers, and research productivity. Continuous variables were reported as means with Standard Deviations (SD), while categorical variables were described using counts and percentages. Due to the non-normal distribution of the data, group comparisons were conducted using the Mann-Whitney U test, with statistical significance defined as $p<0.05$. Logistic regression analysis was performed to identify factors associated with having at least one publication, using scoring system phase (pre-transition vs. post-transition) and medical school NIH funding level (high *vs.* non-high) as independent variables. All statistical analyses were carried out using Python (version 3.12).

Results

A total of 650 OB/GYN residents were included in the study, with 323 residents from the class of 2026 (pre-Step 1 transition) and 327 residents from the class of 2028 (post-Step 1 transition). Of these, eight residents (1.2%) held MD/PhD degrees, with four in each group.

Overall, the total number of publications, first authorships, as well as in-specialty publications increased from pre-transition to post-transition (Figure 1). The mean total publication count increased significantly from 1.07 to 1.73 (p=0.001). The number of first authorships increased from 0.32 pre-transition to 0.51 post transition (p=0.005). Additionally, the number of in-specialty publications increased from 0.47 to 0.79 post transition (p=0.002). The citation count decreased from 1.63 pre-transition to 1.28 post-transition, but this difference was not statistically significant (p= 0.257).

Next, the total number of publications, first authorship, in-specialty publications, and citation count stratified by NIH Funding level (Table 1) were examined. The number of total publications, first authorships, and in-specialty publications for all levels of NIH funding from pre-transition to post-transition increased. For total publications, only residents from medical schools with moderate NIH funding increased by a significant amount (0.79 *vs.* 1.56, p=0.02). The number of first authorships for low NIH funded schools increased by a significant amount (0.14 *vs.* 0.35, p=0.028). When looking at in-specialty publications, for highly funded (0.68 *vs.* 1.12, p=0.038) and moderately funded (0.30 *vs.* 0.65, p=0.007) medical schools both increased by a significant amount, with a non-significant increase for lower funded schools (0.19 *vs.* 0.23, p=0.779. Examination of both

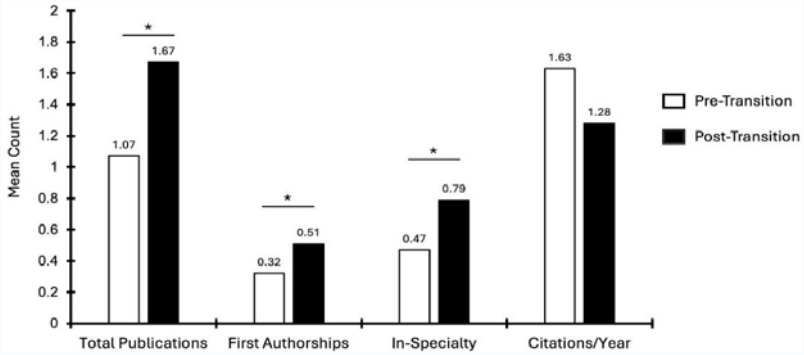

Figure 1: Compares the total number of publications, first authorships, in-specialty publications, and citations/year before Step 1 was pass/fail (white) and after (black). A bar denotes the difference was statistically significant.

Table 1: Analysis of research metrics stratified by NIH funding level.

	NIH Level	Pre-Transition (mean±SD)	Post-Transition (mean±SD)	*p*
Total Publications	High	1.49 ± 2.06	2.17 ± 3.09	0.05
	Moderate	0.79 ± 1.29	1.56 ± 2.60	0.02*
	Low	0.38 ± 0.66	0.65 ± 0.89	0.134
First Authorships	High	0.43 ± 0.83	0.60 ± 1.08	0.154
	Moderate	0.27 ± 0.58	0.50 ± 0.90	0.095
	Low	0.14 ± 0.47	0.35 ± 0.60	0.028*
In-Specialty	High	0.68 ± 1.31	1.12 ± 1.99	0.038*
	Moderate	0.30 ± 0.76	0.65 ± 1.38	0.007*
	Low	0.19 ± 0.45	0.23 ± 0.52	0.779
Citation Count	High	2.35 ± 4.83	1.66 ± 2.45	0.747
	Moderate	0.90 ± 1.64	1.13 ± 2.23	0.241
	Low	0.59 ± 1.42	0.59 ± 1.62	0.445

Comparison of total publications, first authorships, in-specialty publications, and citation count by program rank based on level of NIH funding (high, moderate, low). Statistically significant differences are denoted with an asterisk*.

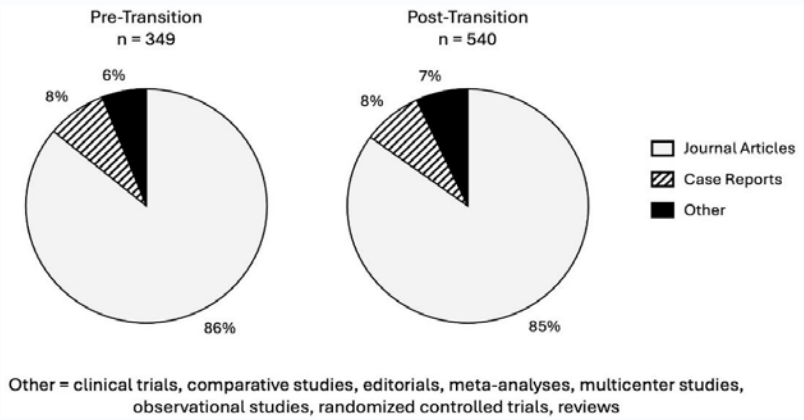

Figure 2: Ranks residency programs by prestige (top, middle, bottom) and compares total number of publications, first authorships, in-specialty publications, and citations/year before Step 1 was pass fail (white) and after (black). A bar means the difference was statistically significant.

pre-transition and post-transition showed that schools with higher level of NIH funding had increased number of publications, first authorships, in-specialty publications compared to those with lower NIH funding.

Comparative analysis of research metrics stratified by residency program rank examined the total number publications, first authorships, and in-specialty based on the fifty residency program ranks, split into top, middle, and bottom (Figure 2). There was an overall increase in all three following the transition, but only a significant increase of the middle-ranked programs. For total publications there was an increase from 0.98 to 2.05 (p=0.003) following the transition. The number of first authorships increased from 0.26 to 0.58 (p=0.003) for middle-ranked programs following the transition. The number of in-specialty publications for middle-ranked programs increased from 0.33 to 1.01 (p=0.007) following the

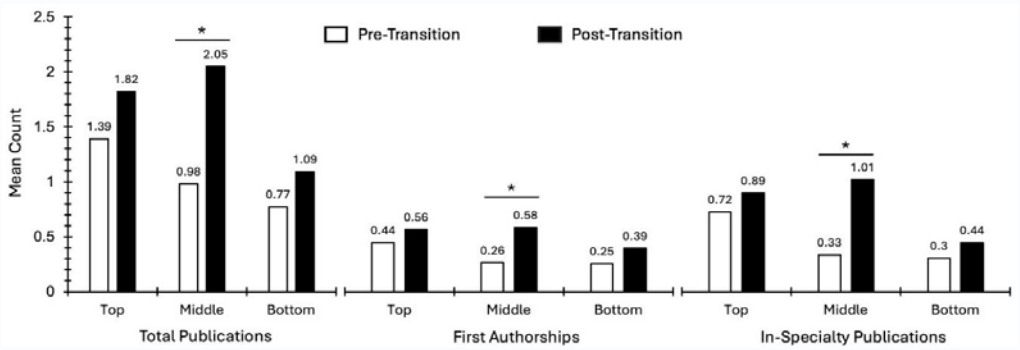

Figure 3: Shows the percentage of publications that were journal articles, case reports or other. Other includes clinical trials, comparative studies, editorials, meta-analyses, multicenter studies, observational studies, randomized controlled trials, and reviews.

Table 2.1: Percentile breakdown of research output in pre-transition by tertile.

	Publications	1A	IS	Citations
70th to 90th	2.3	0.67	1	2.9
40th to 60th	0.3	0	0	0.1
10th to 30th	0	0	0	0

Table 2.2: Percentile breakdown of research output in post-transition by tertile.

	Publications	1A	IS	Citations
70th to 90th	2.9	1.3	1.3	2.3
40th to 60th	0.67	0	0	0.37
10th to 30th	0	0	0	0

transition.

The most common types of publications, both pre and post transition, were journal articles and case reports, with both increasing following the transition, as seen in Figure 3. The total number of publications increased by over 35% from pre-transition to post-transition.

We also looked at the breakdown of residencies by percentile from pre and post transition (Table 2). The top tertile saw an increase in publications, first authorship, and in-specialty publications. However, the number of citations decreased. The second tertile saw a slight increase in overall publications and citations. The third tertile remained the same pre and post transition.

Table 2.1 and 2.2 show the residences ranked by prestige, broken into three percent tertiles, with average number of publications, first authorships, in-specialty publications, and citations for pre and post transition.

Comments

This study assessed the impact of the USMILE Step 1 transition from graded to pass/fail scoring on the pre-residency research productivity of matched OB/GYN residents. Our findings demonstrate a statistically significant increase in total publications, first authorships, and in-specialty publications after the transition. These results suggest an increased emphasis on research involvement among medical students in response to the elimination of numerical Step 1 scores.

Implications for medical education

Our findings align with emerging data from other specialties, indicating that the transition to pass/fail Step 1 scoring has shifted student efforts toward alternative distinguishing metrics, the most notable being research productivity. A study by Lichtbroun *et al.,* found third- and fourth-year medical students felt an increased need to engage in research and other extracurriculars earlier in medical school following the transition [12]. They also found that students hopping to match into more competitive specialties felt they were at a disadvantage if they could not afford to take a research year, compared to their peers [12]. They also surveyed plastic surgery Program Directors (PDs) and reported that 45% of PDs thought dedicated research time would be become more important following the transition [12]. Girling *et al.,* surveyed OB/GYN residency PDs and reported that they thought the number of research productivity and volunteer experiences would have the greatest increase in importance following the pass/fail transition [13]. However, they did report that most PDs ranked clerkship grades as the most important variable both before and after the transition [13].

Students from top NIH-funded institutions consistently produced more total publications, first authorships, and in-specialty publications both before and after the transition than less funded institutions. Interestingly, citation count only increased post-transition among students from lower-funded schools, suggesting publication of lower cost research (case reports, literature reviews, etc.) may still carry scholarly impact. PDs must be made aware of the variability in research opportunities for different OB/GYN residency candidates.

Stratification by residency program rank revealed that while top-ranked programs had the highest research productivity, mid and lower tier programs also saw meaningful increases post-transition. The rise in publication volume across all residency tiers underscores a growing and more universal pressure to publish, regardless of program prestige and despite variability in opportunities.

Implications for graduate training

The growing emphasis on research productivity may influence how applicants spend their time and resources during medical school. This could potentially divert medical student's attention from other forms of clinical or leadership development. However, research is a critical part of advancing medicine, with more medical students getting involved in research earlier could lead to vast improvements in the OB/GYN field. However, students at institutions with few research opportunities may face growing disparities when applying to residency, contributing to broader inequities in resident selection. Given OB/GYN's critical role in providing primary care to women, disparities in research training could ultimately affect innovation and

equity in women's health.

While our data is consistent with similar trends seen in other specialties, there are key factors to consider with OB/GYN and women's health limitations. In 2018, OB/GYN only represented 1% of all total NIH funding, despite being a major provider of primary care services [14]. Additionally, only 4% of NIH R-series and 7% of K- series career development grants were designated to the National Institute of Child Health and Human Development, which directly funds women's health [14].

There is also suspected to be a lower percentage of OB/GYN physicians who are actively involved in research compared to their peers. This could be due to the difficulties getting funding or the demand for the career. An older study done in 1990, showed that only about 10% of OB/GYN faculty were principal investigators on projects compared to an average of 14% across other specialties [12]. There is limited data available on the amount of current OB/GYN physicians actively involved in research. OB/GYN is a majority female field, and Wooding et al emphasize that women are less than half as likely as men to be full professors [15]. When looking at subspecialties they found that in gynecologic oncology, women were less likely to be advanced from assistant professor to full professor, despite equivalent authorship trends [15]. This can prevent the availability of medical students to get involved in OB/GYN research and contribute meaningfully to the field.

Research implications

With Step 1 becoming pass/fail, there is the potential that Step 1 scores will become less relevant, and research output can be used as a proxy for academic potential and success in residency. However, as we have seen, research opportunities are not always equal for all students. Future studies should examine the long-term outcomes of this shift, whether the increased volume of publications translates to better clinical care, more equitable match outcomes, or reinforcing existing institutional hierarchies. Additionally, given OB/GYN's representation in NIH funding, further investigation is needed into how funding limitations affect student engagement in research and long-term academic productivity within the specialty.

Strengths and limitations

Strengths of our study include a large sample size, resulting in statistically significant conclusions. Additionally, looking at residency programs by NIH funding level as well as "prestige" rank allows different perspectives arrive at the same conclusion. However, limitations include that the "prestige" ranks come from Doximity, which is not always an objective source. Additionally, this was an observational study and causality cannot be inferred.

Conclusions

The transition to pass/fail Step 1 scoring appears to be associated with increased pre-residency research productivity among OB/GYN residents. While this shift may reflect adaptive behaviors by students in a changing evaluative landscape, it also highlights the growing importance of research in match process. Importantly, unequal access to research infrastructure, particularly in women's health, may widen disparities in residency competitiveness. Addressing these gaps is essential for fostering a more equitable and inclusive academic pipeline in OB/GYN.

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Declaration of Competing Interests

The authors have no competing interests to disclose.

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Ethics Statement

This work complies with the standards put forth by Elsevier's Publishing Ethics Policy.

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