

A Preliminary Evaluation of Students' Learning and Performance Outcomes in an Accelerated 3-Year MD Pathway Program

Joan Cangiarella, MD
Kinga Eliaz, PhD
Adina Kalet, MD, MPH

Elisabeth Cohen, MD
Steven Abramson, MD
Colleen Gillespie, PhD

ABSTRACT

Background Little outcome data exist on 3-year MD (3YMD) programs to guide residency program directors (PDs) in deciding whether to select these graduates for their programs.

Objective To compare performance outcomes of 3YMD and 4-year MD (4YMD) students at New York University Grossman School of Medicine.

Methods In 2020, using the Kirkpatrick 4-level evaluation model, outcomes from 3 graduating cohorts of 3YMD students (2016–2018) were compared with the 4YMD counterparts.

Results Descriptive statistics compared outcomes among consented student cohorts: 92% (49 of 53) 3YMD, 87% (399 of 459) 4YMD-G, and 84% (367 of 437) 4YMD-S. Student survey response rates were 93% (14 of 15), 74% (14 of 19), and 89% (17 of 19) from 2016 to 2018. PDs' response rates were 58% (31 of 53, 3YMD) and 51% (225 of 441, 4YMD). Besides age, 3YMD and 4YMD cohorts did not differ significantly in admissions variables. Other than small statistically significant differences in the medicine shelf examination (3YMD mean 74.67, SD 7.81 vs 4YMD-G mean 78.18, SD 7.60; t test=3.02; P =.003) and USMLE Step 1 (3YMD mean 235.13, SD 17.61 vs 4YMD-S mean 241.70, SD 15.92; t test=2.644; P =.009 and vs 4YMD-G mean 242.39, SD 15.65; t test=2.97; P =.003) and Step 2 CK scores (3YMD mean 242.57, SD 15.58 vs 4YMD-S mean 248.55, SD 15.33; t test=2.55; P =.01 and vs 4YMD-G mean 247.83, SD 15.38; t test=2.97; P =.03), other metrics and overall intern ratings did not differ by pathway.

Conclusions Exploratory findings from a single institution suggest that 3YMD students performed similarly to 4YMD students in medical school and the first year of residency.

Introduction

With the recent resurgence in interest and growth of time-accelerated MD programs, more graduates of accelerated 3-year MD (3YMD) programs are applying to residency programs.¹ Historically, residency program directors (PDs) have expressed bias against accepting 3YMD graduates into their residency programs,² voicing concerns around competency, readiness, and levels of maturity.³

Over the last 7 years, the Consortium of Accelerated Medical Pathway Programs, funded by the Josiah Macy Jr Foundation,¹ has added members from approximately 19% of US allopathic medical schools. Numerous benefits have been attributed to 3YMD pathway programs^{1,4} including decreasing student debt.^{4,5} Opponents cite the negative impact on student well-being and elimination of sufficient instruction in medical ethics, global health, patient safety, and intensive advanced clinical exposures.⁶ A

2014 survey of PD views of accelerated 3YMD pathways illustrated concerns about depth of clinical exposure, direct patient care experience, and overall competence.³ With the continued growth in the number of 3YMD graduates, knowledge of comprehensive outcome data as compared to 4-year MD (4YMD) students will be helpful to PDs in deciding how strongly to consider 3YMD students for acceptance into their residency programs.

We present preliminary outcome data on 3YMD pathways by reporting our experience at New York University Grossman School of Medicine (NYUGSOM). We compare the demographics, curricular experiences, and learning and performance outcomes of 53 students—the first 3 graduating cohorts from the accelerated 3YMD pathway (classes of 2016–2018)—with their 4YMD graduate counterparts.

Methods

Setting and Participants

A 2010 curricular redesign led to the creation of individualized pathways, including an accelerated 3YMD pathway. Students are first accepted into the

DOI: <http://dx.doi.org/10.4300/JGME-D-21-00284.1>

Editor's Note: The online version of this article contains the surveys used in the study and a list of outcomes being assessed using the Kirkpatrick evaluation model.

4YMD pathway, and those who are certain of their career choice can apply to the 3YMD pathway prior to matriculation. The 3YMD application package, which includes the student's medical school application and additional essays describing why they have chosen a specific career and what experiences they have participated in to support their choice, are then sent to the PD of the program of interest to the student. The PD and other faculty members within the department interview the applicant and decide whether or not to accept based on their medical school application, the additional essays, the strengths of knowing their career path, and the fit for the residency program. There are additional time points at the end of year 1 and year 2 of medical school where students can apply to the 3YMD pathway with the same application process described above. At NYUGSOM, acceptance to the accelerated pathway includes direct progression into one of 20 residency programs.

The 3YMD program is a 130-week pathway with a curriculum identical to the 4YMD program for the first 2 and a half years (18-month pre-clerkships and 12-month clerkships). Student progression and academic standards for program completion are also identical. The last 6 curricular months include a sub-internship, a 1-month critical care rotation, 6 weeks of selective/electives, and sitting for the United States Medical Licensing Examination (USMLE) Step 1 and Step 2. The 4YMD students have 26 weeks of additional curricular requirements, but since the 3YMD students complete 8 weeks of requirements in the summer between year 1 and year 2, the 3YMD program is only 18 weeks shorter than the 4YMD program. Details on the structure and design of the curriculum have been published previously.⁷

There are 3YMD pathway positions across all 20 residency programs at NYUGSOM. With most accelerated programs matriculating only small numbers of students each year, the accumulation of a relevant sample size for data analysis has taken time. There were 53 3YMD graduates from 2016 to 2018 (16 students in 2016; 19 each in 2017 and 2018) who comprised approximately 11% of graduates for that time period. In 2020, we compared the demographics, curricular experiences, and learning and performance outcomes of these 53 students with their 4YMD graduate counterparts to form the basis of this report. Fifty-one students are currently in a residency program at NYU (14 postgraduate year [PGY] 4, 18 PGY-3, and 19 PGY-2). Two students (1 PGY-4 and 1 PGY-3) graduated in 3 years but matched to residency programs outside of NYU.

Whenever possible, up to 2 levels of peer comparison were made to assess the 3YMD graduates: (1)

Objectives

To assess outcomes of students in an accelerated 3-year MD (3YMD) Pathway Program.

Findings

3YMD students perform similarly to 4-year MD students in medical school and in the first year of residency.

Limitations

These findings are from a single institution's first 3 graduating classes.

Bottom Line

By reporting the early positive outcomes of a 3YMD pathway program, more medical schools may consider developing an accelerated program.

comparing 3YMD graduates with the 4YMD students they *started* medical school with (4YMD-S) because this group experienced the same curriculum and the same admissions cycle, and (2) comparing 3YMD graduates with the 4YMD students they *graduated* with (4YMD-G) because these are their peers at the start of residency.

Interventions

We organized 3YMD pathway questions around the 4 levels of the Kirkpatrick model for evaluating training programs: Reaction (experience of the curriculum), Learning (examination performance), Behavior (skills and competencies), and Results (workplace performance).⁸ The outcomes assessed at each level of the Kirkpatrick model are summarized in the online supplementary data and described in the following section.

Outcomes Measured

Reaction (Kirkpatrick Level 1): This was assessed via an online survey at graduation asking 3YMD students to self-assess core clinical skills compared to peers, rate sufficiency of examination study time (no/yes), assess preparedness for residency, and answer questions about the strengths and weaknesses of the program. For the latter, we used simple content analysis to identify major themes. We compared 3YMD and 4YMD students' responses to the question about overall satisfaction with the quality of their medical education.

Learning (Kirkpatrick Level 2): The 3 cohorts of graduating 3YMD students' medical knowledge examination scores, clerkship grades (number of honors), National Board of Medical Examiners (NBME) shelf examination scores, and USMLE Step 1 and Step 2 CK scores were compared with both 4YMD-S and 4YMD-G students.

Behavior (Kirkpatrick Level 3): This was assessed via a high-stakes, 8-station objective structured clinical examination (Comprehensive Clinical Skills Examination [CCSE]) after students' core clerkship year and an innovative, immersive, end-of-training Night-on-Call (NOC) simulation,^{9,10} designed to assess and address readiness-for-internship, based on the Association of American Medical Colleges (AAMC) 13 entrustable professional activities (EPAs),¹¹ a few weeks prior to graduation. In 2016 NOC was an institutional review board (IRB) approved research project that specifically compared performance of the 3YMD students with students in their third and fourth years of the traditional 4YMD pathway. This study focused only on the initial 3YMD class (Class of 2016; 12 of 15 participating, 80%).

Both the CCSE and NOC assess the same core clinical skills (communication, history gathering, and physical examination) by highly trained standardized patients using the same behaviorally anchored checklists with “not done,” “partly done,” and “well done” options. NOC also assesses clinical reasoning (based on rating of notes) and interprofessional teamwork and uses multiple perspectives (up to 4 assessors per student for each case) such as standardized patients, standardized nurses, medical librarians, and physicians to assess student performance.

Results (Kirkpatrick Level 4): Defined as workplace-based outcomes, the Results were assessed through PDs' ratings of graduates' overall performance and degree of supervision needed for the AAMC's 13 EPAs. PDs rated the preparedness and effectiveness of our graduates 9 months into internship via an online survey our medical school sends out directly to PDs (with response rates from 52% to 60%; survey included as online supplementary data). For these analyses, we compared 3YMD students with 4YMD-G students.

Analysis of the Outcomes

Given the small 3YMD sample, simple independent *t* test or analysis of variance (ANOVA) was used to compare continuous and ordinal means of those students with their 4YMD counterparts (4YMD-G and 4YMD-S cohorts wherever possible). For ordinal variables, non-parametric comparisons of medians were also conducted, but, because the results were the same, we are reporting means and simple mean comparison statistics in the associated tables to facilitate interpretation. A 2×3 ANOVA (Factor 1: 3YMD vs 4YMD; Factor 2: Class year) explored whether there were significant differences in USMLE

Step 1 and Step 2 CK scores by class year or in the interaction between 3YMD vs 4YMD and class year.

Given the small sample sizes and our interest in identifying differences among these cohorts, we used the significance criterion of $P < .05$ and did not adjust for “experiment-wise” error (the number of comparisons), prioritizing our exploratory interest in finding differences over minimizing Type 1 error (the risk of “false positives” or mistakenly reporting a difference that doesn't exist).

Study data are covered by 3 IRB-approved protocols. The use of routinely collected education data (learning and clinical skills data) for this study are covered by our Medical Student Research Registry (de-identified research education data sets, IRB #08-674). Consent rates are 92% (49 of 53) for the 3YMD students, 87% (399 of 459) for the 4YMD-G cohorts, and 84% (367 of 437) for the 4YMD-S cohorts—missing or incomplete data vary by dataset. An additional IRB study was approved for a graduation survey and post-graduation outcomes (including in-depth qualitative interviews with PDs and post-residency surveys) for 3YMD students (IRB #16-02152). While 92% (49 of 53) of 3YMD students provided consent for allowing their data to be used in research, fewer students responded to the graduation survey, leading to 85% (45 of 53) of 3YMD students included for this data source. Finally, the NOC simulation was initially implemented as an IRB-approved research study (IRB #14-00867). Only students who provided written informed consent were included in the analyses; 3YMD consent rate is 80% (12 of 15), class of 2016.

Results

Program Numbers, Demographics, Admissions, and Residency Metrics

TABLE 1 demonstrates that, except for mean age, there were no statistically significant differences in key demographics and admissions data when comparing 3YMD students to either the 4YMD-S or 4YMD-G students. Distribution of residency matches were similar between the 3YMD and 4YMD-S/4YMD-G students with 25% of students pursuing internal medicine in both pathways and the remaining specialities represented at much lower rates (0% to 10%). However, primary care was overrepresented in the 3YMD students (6%) compared with 4YMD students (1%) as were orthopedics (8% vs 4%) and radiology (8% vs 2%). Emergency medicine was underrepresented in the 3YMD students (4%) compared with 4YMD students (10%).

TABLE 1

Admission Characteristics of 3YMD Students Compared to 4YMD Pathway Students (4YMD-S, 4YMD-G)

Variables	3YMD (n=49)	4YMD-S (n=350)	3YMD vs 4YMD-S Comparison ^a	4YMD-G (n=363)	3YMD vs 4YMD-G Comparison ^a
Mean age years (SD)	23.15 (2.90)	22.26 (1.81)	t=2.05 P=.04	22.19 (1.89)	t=2.21 P=.03
Mean GPA (SD)	3.82 (0.12)	3.80 (0.15)	t=0.89 P=.38	3.80 (0.15)	t=1.09 P=.28
Mean MCAT percentile (SD)	93.99 (6.02)	93.22 (7.74)	t=0.67 P=.50	92.20 (7.56)	t=1.59 P=.11
Gender, % female	59 (29/49)	47 (164/350)	chi square=1.92 P=.11	46 (167/363)	chi square=3.11 P=.06
Underrepresented in medicine, %	8 (4/49)	17 (59/350)	chi square=2.03 P=.15	12 (44/363)	chi square=0.36 P=.63

Abbreviations: 3YMD, 3-Year MD; 4YMD, 4-Year MD; 4YMD-S, 4-Year MD Student; 4YMD-G, 4-Year MD Graduate; GPA, grade point average; MCAT, Medical College Admission Test.

Note: Bolded results are significant ($P < .05$).

^a Independent samples t tests with P values (non-parametric tests of median differences produced same results) and chi-square tests for gender and underrepresented in medicine distribution.

Kirkpatrick Level 1: 3YMD Program Evaluation Survey (TABLE 2)

Ninety-three percent to 100% of 3YMD students rated their skills during the sub-internships as the same, somewhat better, or much better in comparison to their 4YMD counterparts. Seventy-three percent (32 of 44) of 3YMD students across all 3 classes felt that they had enough time to prepare for USMLE Step 1, but only 57% (25 of 44) felt that they had enough time to prepare for Step 2 CK. The vast majority of both 3YMD and 4YMD students agreed strongly or somewhat that they were satisfied with the quality of medical school, with 3YMD slightly, but not significantly, more satisfied than their 4YMD peers: 97%

satisfied (38 of 39) vs 93% (289 of 312); chi square=1.258, $P=.26$.

In the open-ended questions, strengths of the program were focused on 3 major themes: (1) the guarantee of direct progression into an NYU residency, described as freedom to pursue additional or delve more deeply into current interests/experiences; (2) the earlier connection with residency programs at their own institution that facilitated research opportunities, clinical experiences, and specialty-specific advising, as well as ensured continuity throughout medical school; and (3) the strong mentoring and advising provided by the 3YMD pathway. Weaknesses cited, especially in

TABLE 2

Kirkpatrick Level 1: Student Evaluation of 3YMD From 3 Graduating Cohorts (Classes of 2016, 2017, 2018)

Variables	Class of 2016	Class of 2017	Class of 2018	Chi Square	P Value		
3YMD program (n)	15	19	19	3.01	.22		
Provided consent, %	93 (14/15)	95 (18/19)	89 (17/19)				
Responded to survey, % (response varies by item)	100 (14/14)	78 (14/18)	100 (17/17)				
Response rate, %	93 (14/15)	74 (14/19)	89 (17/19)	1.91	.39		
% of students that rate their skills as the same, somewhat better, or much better in comparison to other MS4 students on their sub-internships	93 (13/14)	100 (13/13)	100 (13/13)				
% of students who felt they had enough preparation time for the Step 1	54 (7/13)	79 (11/14)	82 (14/17)			3.37	.19
% of students who felt they had enough preparation time for the Step 2 CK	69 (9/13)	50 (7/14)	53 (9/17)			1.04	.60
% of students who felt moderately or very prepared for residency	100 (14/14)	100 (13/13)	88 (15/17)	3.33	.19		

Abbreviation: 3YMD, 3-Year MD.

TABLE 3
Kirkpatrick Level 2: Comparing 3YMD and 4YMD Pathway Students (4YMD-S, 4YMD-G) in Curricular and National Performance Outcomes

Variables	3YMD n=48/53, Mean (SD)	4YMD-S n=367/ 437, Mean (SD)	3YMD vs 4YMD-S Comparison ^a		4YMD-G n=399/ 459, Mean (SD)		3YMD vs 4YMD-G Comparison ^a	
			t test	P Value	t test	P Value		
Medical knowledge examination mean scores	82.50 (4.60)	82.16 (4.79)	0.47	.64	82.43 (5.07)	0.09	.93	
No. of clerkships earned honors grade	5.06 (2.34)	5.46 (3.06)	0.77	.29	4.91 (3.10)	0.57	.69	
Medicine shelf examination scores	74.67 (7.81)	76.78 (7.27)	1.88	.06	78.19 (7.60)	3.02	.003	
Neurology shelf examination scores	76.69 (7.74)	77.32 (7.69)	0.53	.60	75.72 (7.51)	0.85	.40	
OB-GYN shelf examination scores	78.51 (7.44)	78.69 (7.15)	0.16	.87	77.78 (7.44)	0.65	.52	
Pediatrics shelf examination scores	75.16 (6.33)	75.90 (8.71)	0.56	.58	76.31 (8.92)	0.86	.39	
Psychiatry shelf examination scores	83.20 (6.82)	84.22 (6.96)	0.96	.34	84.71 (7.98)	1.41	.16	
Surgery shelf examination scores	74.19 (8.05)	74.80 (7.60)	0.51	.61	75.90 (7.88)	1.39	.17	
Step 1 examination scores	235.13 (17.61)	241.70 (15.92)	2.64	.009	242.39 (15.65)	2.97	.003	
Step 2 Clinical Knowledge examination scores	242.57 (15.58)	248.55 (15.33)	2.55	.01	247.83 (15.38)	2.24	.03	

Abbreviations: 3YMD, 3-Year MD; 4YMD-S, 4-Year MD Student; 4YMD-G, 4-Year MD Graduate.

Note: Bolded results are significant ($P < .05$). Follow-up 2x3 analyses of variance (ANOVAs) did not find any significant differences in these scores by class year or in the interactions between class year and pathway. In all 4 ANOVAs, class year did not have a significant effect (Step 1: class year started with $F=0.49$, $df=2$, $P=.68$; class year graduated with $F=0.18$, $df=2$, $P=.83$; Step 2CK: class year started with $F=0.71$, $df=2$, $P=.49$; class year graduated with $F=0.23$, $df=2$, $P=.79$) and the class year by pathway (3YMD vs 4YMD) interaction was also not significant (Step 1: class year started with x pathway $F=0.44$, $df=5$, $P=.65$; class year graduated with x pathway $F=0.83$, $df=5$, $P=.44$; Step 2CK: class year started with by pathway $F=0.44$, $df=5$, $P=.65$; class year graduated with by pathway $F=0.43$, $df=5$, $P=.65$). Only the main effects of pathway were significant. Step 1 and Step 2 CK scores did not differ by class year and did not differ by the interaction between class year and pathway.

^a Independent samples t tests with P value (non-parametric tests of median differences produced same results).

TABLE 4
Kirkpatrick Level 3: Comparing 3YMD and 4YMD Performance Outcomes (% Well Done items) on 2 Comprehensive Performance-Based Simulations

Assessment Domain ^a	% Items Rated Well Done	Night-onCall Outcomes				ANOVA Sig	Comprehensive Clinical Skills Examination Outcomes					
		3YMD, N=12, Mean (SD)	4YMD in 3rd Year N=36, Mean (SD)	4YMD in 4th Year N=25, Mean (SD)	4YMD-S N=367/437		3YMD vs 4YMD-S Comparison ^a		4YMD-G N=399/459		3YMD vs 4YMD-G Comparison ^a	
							t test	P value	t test	P value	t test	P value
Core clinical skills Standardized patient perspective	Communication	72.23 (25.89)	71.15 (20.44)	67.44 (24.16)	F(2,70)=0.263, P=.77	82.53 (9.54)	83.88 (8.23)	0.98	.33	82.31 (9.58)	0.95	.36
	History gathering	44.64 (22.40)	36.95 (19.69)	43.09 (18.70)	F(2,70)=1.144, P=.32	59.73 (8.01)	61.01 (7.44)	1.06	.29	60.41 (7.18)	0.80	.49
	Physical examination	58.98 (11.93)	54.72 (19.02)	47.30 (19.26)	F(2,70)=2.038, P=.14	65.36 (10.91)	66.61 (9.70)	0.79	.43	65.92 (9.01)	0.79	.43
Clinical reasoning Faculty perspective	Clinical reasoning	65.63 (21.69)	69.10 (22.91)	70.84 (23.48)	F(2,70)=0.210, P=.81							
Interprofessional teamwork Standardized nurse perspective	Phone communication	44.34 (22.80)	45.98 (27.64)	37.48 (25.03)	F(2,70)=0.812, P=.45							
	Patient care in room	30.75 (17.79)	40.69 (26.41)	26.42 (22.28)	F(2,70)=2.789, P=.07							
	Relationship development and professionalism	59.29 (32.35)	61.09 (36.35)	51.41 (33.70)	F(2,70)=0.589, P=.56							

Abbreviations: 3YMD, 3-year MD; 4YMD, 4-year MD.

Note: The right section of the table includes percent well done performance in the core clinical skills of Comprehensive Clinical Skills Examination, in addition to differences between 3YMD and 4YMD students (4YMD-Started and 4YMD-Graduated). The left section of the table includes percent well done performance in the core clinical skills, clinical reasoning, and interprofessional teamwork of Night-onCall, in addition to differences between 3YMD and 4YMD students (those in the third year of the traditional program and those in the fourth year of the traditional program).

^a Independent samples t tests with P values (non-parametric tests of median differences produced same results).

TABLE 5

Kirkpatrick Level 4: Comparing 3YMD and 4YMD Students (4YMD-G Only) Ratings on Workplace-Based Readiness Outcomes on Residency Program Director Survey Ratings of Graduates as Interns

Variables	3YMD n=31, Mean (SD)	4YMD-G n=225, Mean (SD)	Comparison ^a	
			t test	P Value
Overall performance	3.35 (0.71)	3.45 (0.60)	0.60	.42
EPA 1: Gather a history and perform a physical examination	3.32 (0.54)	3.31 (1.33)	0.06	.95
EPA 2: Prioritize a differential diagnosis	3.06 (0.44)	3.03 (1.05)	0.20	.85
EPA 3: Recommend and interpret common diagnostic and screening tests	3.06 (0.44)	2.07 (1.05)	0.48	.63
EPA 4: Enter and discuss orders and prescriptions	2.90 (0.60)	2.00 (1.07)	0.45	.66
EPA 5: Written note	3.10 (0.60)	3.20 (1.03)	0.53	.60
EPA 6: Oral presentation	3.26 (0.51)	3.30 (1.04)	0.25	.81
EPA 7: Form clinical questions and retrieve evidence	3.17 (0.59)	2.04 (1.56)	1.50	.14
EPA 8: Give or receive a patient handover to transition care	2.74 (0.82)	2.91 (1.36)	0.65	.51
EPA 9: Interprofessional collaborative practice	3.23 (0.56)	3.26 (1.05)	0.29	.77
EPA 10: Recognize a patient requiring urgent or emergent care	2.94 (0.68)	2.96 (1.32)	0.08	.94
EPA 11: Obtain informed consent	2.81 (0.75)	2.87 (1.96)	0.18	.86
EPA 12: Perform general procedures of a physician	2.42 (2.41)	2.60 (2.54)	0.38	.71
EPA 13: Identify system failures and contribute to a culture of safety and improvement	3.03 (0.71)	3.05 (1.15)	0.06	.95

Abbreviations: 3YMD, 3-Year MD; 4YMD-G, 4-Year MD graduate; EPA, entrustable professional activities.

^a Significance: Independent samples t tests with P value (non-parametric tests of median differences produced same results).

Note: Overall performance rating: 1–4 scale (1=Below average; 2=Marginal; 3=Average; 4=Above average). Core EPAs for entering residency rating: 1–4 scale (1=Cannot perform even with direct supervision; 2=Requires direct supervision; 3=Requires indirect supervision; 4=Can perform without supervision).

the first cohort, centered on initial confusion regarding processes and timelines, unclear expectations, and changes in the program, as well as on the general challenge of time and timing (eg, “timing and scheduling to prepare for major exams”).

Kirkpatrick Level 2: Curricular and National Knowledge and Clinical Examinations

Except for the NBME medicine shelf examination, medical school performance was similar for 3YMD and 4YMD students on all curricular examinations including medical knowledge tests, percentage of honors in the clerkships, and other NBME subject shelf examinations (TABLE 3).

4YMD students averaged 5 to 6 points higher than 3YMD students on USMLE Step 1 and Step 2 CK scores. These results were similar across the 3 class years (TABLE 3).

Kirkpatrick Level 3: Comprehensive Performance-Based Simulation Outcomes

CCSE Performance Outcomes: Performance on the CCSE did not differ between 3YMD and 4YMD-S or 4YMD-G students (TABLE 4).

NOC End-of-Training Simulation Performance Outcomes: Comparison of the performance of the first

graduating cohort of 3YMD students with third- and fourth-year students in the traditional 4YMD program showed that there were no significant differences across the 3 groups evaluated across various NOC activities (TABLE 4).

Kirkpatrick Level 4: Workplace-Based Readiness Outcomes

For those graduates for whom we received completed surveys (and for whom we had consent) (58%, 31 of 53, for 3YMD and 51%, 225 of 441, for 4YMD students), PDs’ ratings of 3YMD graduates as interns (TABLE 5) showed no significant differences in overall performance or in the assessment of any of the 13 AAMC EPAs (or core competencies) as compared to the 4YMD interns with whom they graduated.

Discussion

Using the Kirkpatrick 4-level evaluation model,⁸ this study found that 3YMD students were similar to 4YMD students on key admission variables (except for age) and performed similarly to 4YMD students both in medical school and in the first year of residency, which is consistent with findings published in the 1970s.^{12–14} While these data are preliminary,

they should be useful to PDs as they decide how strongly to consider 3YMD students for acceptance into their residency programs.

The 3YMD and 4YMD programs at NYUGSOM are similar for the first 2 and a half years and have essentially the same pre-clerkship and clerkship curriculum. However, 3YMD students and 4YMD-G students completed their core clerkships in different years, a potential explanation for the 3YMD's slightly but significantly lower medicine shelf examination scores. With the only other significant difference in performance being the slightly lower USMLE scores in 3YMD students, other explanations may be that these students have fewer weeks of study time in the accelerated program as compared to 4YMD students, with fewer than 6 weeks of study time for Step 1 and 2 weeks of study time for Step 2. Another, perhaps more plausible, explanation could be that, since many accelerated programs have a direct path into their own residency programs, students may pursue material that interests them and focus less on achieving a high score on standardized examinations. This was noted in our 3YMD student evaluation survey where students highlighted focusing on interests over grades as a strength of the accelerated pathway. If this is true, and depending on the predictive value of small examination score differences, it could be a significant strength of the program and not a threat to its long-term success. Further study is required. Whether or not scores on the USMLE correlate with clinical performance and what counts as "clinically" meaningful score differences are under debate as the source of significant discussion during InCUS (Invitational Conference on USMLE Scoring).¹⁵ A recommendation from this conference was to accelerate research that would help to determine relationships between USMLE scores and residency performance and future clinical practice.¹⁵

Although limited by sample size, we also found no significant group differences during 2 comprehensive performance-based simulations. While this may seem surprising given that traditional pathway students spend more time in a clinical setting, NOC taps into a new type of skillset that has not been refined by graduating medical students, regardless of pathway. NOC supports and empowers graduating medical students to practice "putting it all together"^{9,10} and can provide a snapshot of performance as medical students prepare for the transition to residency.

Our study had a small sample size and our program is unique in its mission, curriculum, and relationship to residency programs, and thus our findings may not be applicable to other 3YMD

programs. In our program, students stay at the same institution for residency, and PDs who are responsible for assessment during internship may be more comfortable with their performance as interns because they are more familiar with them. It is also worth reinforcing that it is inherently impossible to separate out the effects of selection (who chooses to apply to the 3YMD program and who is chosen) and the accelerated program itself. We did not control for multiple comparisons and acknowledge that as a limitation of this exploratory study.

Despite these limitations, the similarities between the 3YMD and 4YMD cohorts at admissions enhance the strength of our findings by minimizing the influence of substantial differences between the cohorts at the start of medical school. Comparing 3YMD students to their peers also provides an opportunity to begin to disentangle cohort and curricular change influences as more cohort data continue to accumulate. Future studies should follow and assess these graduates into practice and explore both quantifiable and more qualitative indicators of "success" (high-level outcomes) to more fully evaluate accelerated programs.

Conclusions

In this exploratory study, findings showed that 3YMD students perform similarly to 4YMD students in both medical school and the first year of residency.

References

1. Cangiarella J, Fancher T, Jones B, et al. Three-year MD programs: perspectives from the Consortium of Accelerated Medical Pathway Programs (CAMPP). *Acad Med*. 2017;92(4):483–490. doi:10.1097/ACM.0000000000001465
2. Beran RL. The rise and fall of three-year medical school programs. *J Med Educ*. 1979;54(3):248–249. doi:10.1097/00001888-197903000-00011
3. Cangiarella J, Gillespie C, Shea JA, Morrison G, Abramson SB. Accelerating medical education: a survey of deans and program directors. *Med Educ Online*. 2016;21:31794. doi:10.3402/meo.v21.31794
4. Abramson SB, Jacob D, Rosenfeld M, et al. A 3-year M.D.—accelerating careers, diminishing debt. *N Engl J Med*. 2013;369(12):1085–1087. doi:10.1056/NEJMp1304681
5. Leong SL, Gillespie C, Jones B, et al. Accelerated 3-year MD pathway programs: graduates' perspectives on education quality, the learning environment, residency readiness, debt, burnout and career plans [published online ahead of print August 10, 2021]. *Acad Med*. doi:10.1097/ACM.0000000000004332

6. Goldfarb S, Morrison G. The 3-year medical school—change or shortchange? *N Engl J Med*. 2013;369(12):1087–1089. doi:10.1056/NEJMp1306457
7. Cangiarella J, Cohen E, Rivera R, Gillespie C, Abramson S. Evolution of an accelerated 3-year pathway to the MD degree: the experience of New York University Grossman School of Medicine. *Acad Med*. 2020;95(4):534–539. doi:10.1097/ACM.0000000000003013
8. Kirkpatrick DL. *Evaluating Training Programs: The Four Levels*. San Francisco, CA: Berrett-Koehler; 1994.
9. Kalet A, Zabar S, Szyl D, et al. A simulated “night-on-call” to assess and address the readiness-for-internship of transitioning medical students. *Adv Simul (Lond)*. 2017;2:13. doi:10.1186/s41077-017-0046-1
10. Eliasz KL, Ark TK, Nick MW, Ng GM, Zabar S, Kalet AL. Capturing entrustment: using an end-of-training simulated workplace to assess the entrustment of near-graduating medical students from multiple perspectives. *Med Sci Educ*. 2018;28(4):739–747. doi:10.1007/s40670-018-0628-0
11. Association of American Medical Colleges. Core Entrustable Professional Activities for Entering Residency, Curriculum Developers Guide: Association of American Medical College; 2014. <https://www.aamc.org/download/484778/data/epa13toolkit.pdf>. Accessed November 1, 2021.
12. Raymond JR, Kerschner JE, Hueston WJ, Maurana CA. The merits and challenges of three-year medical school curricula: time for an evidence-based discussion. *Acad Med*. 2015;90(10):1318–1323. doi:10.1097/ACM.0000000000000862
13. Hallock JA, Christensen JA, Denker MW, Hochberg CJ, Trudeau WL, Williams JW. A comparison of the clinical performance of students in three- and four-year curricula. *J Med Educ*. 1977;52(8):658–663. doi:10.1097/00001888-197708000-00006
14. Garrard J, Weber RG. Comparison of three- and four-year medical school graduates. *J Med Educ*. 1974;49(6):547–553. doi:10.1097/00001888-197406000-00002
15. Barone MB, Filak AT, Johnson D, Skochelak S, Whelan A. Summary Report and Preliminary recommendations from the Invitational Conference on USMLE scoring (inCUS), March 11–12, 2019. https://www.usmle.org/pdfs/incus/incus_summary_report.pdf. Accessed November 1, 2021.



Joan Cangiarella, MD, is Associate Dean of Education and Faculty, Associate Professor of Pathology, and Director, Accelerated 3-Year MD Pathway, New York University Grossman School of Medicine; **Kinga Eliasz, PhD**, is a Postdoctoral Research Scientist, New York University Grossman School of Medicine; **Adina Kalet, MD, MPH**, is Director, Robert D. and Patricia E. Kern Institute for the Transformation of Medical Education, Medical College of Wisconsin; **Elisabeth Cohen, MD**, is Professor of Ophthalmology and Accelerated 3-Year MD Pathway Advisor, New York University Grossman School of Medicine; **Steven Abramson, MD**, is Vice Dean for Education, Faculty and Academic Affairs, New York University Grossman School of Medicine; and **Colleen Gillespie, PhD**, is Director, Division of Education Quality, and Associate Professor of Medicine, New York University Grossman School of Medicine.

Funding: This study was funded by the Josiah Macy Jr. Foundation, B15-04, Consortium of Accelerated Medical Pathway Programs.

Conflict of interest: The authors declare they have no competing interests.

Corresponding author: Joan Cangiarella, MD, New York University Langone Health, joan.cangiarella@nyulangone.org

Received March 10, 2021; revisions received July 27, 2021, and October 8, 2021; accepted October 21, 2021.