Rising Matriculation Age and the Cost of Delay: Admissions Incentives, Public Investment, and Physician-Years

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Abstract

The average age of U.S. medical school matriculants has steadily increased as gap years have shifted from optional exploration to competitive necessity. Nearly three quarters of recent matriculants are age 23 or older, reflecting delayed entry into medical training. Because medical education is heavily subsidized through federal research funding, graduate medical education payments, and publicly backed student lending, delayed entry into practice carries system-level consequences. This manuscript introduces physician-years as a measure of return on public investment, defined as cumulative years of clinical service delivered after training. Applying observed and projected graduation ages to retirement benchmarks demonstrates a measurable decline in expected physician-years across recent cohorts, with even modest age increases translating into tens of thousands of forfeited physician-years nationally. Simultaneously, admissions incentives that reward prolonged credential accumulation function as socioeconomic filters and misalign with institutional missions centered on diversity, primary care, and service to underserved communities. Realigning admissions incentives to decouple time from competitive advantage offers an upstream strategy to improve workforce supply, equity, and the return on public investment in medical education.

The Rising Matriculation Age

Last year, I was admitted to an early assurance program that guaranteed my seat in medical school. For the first time since starting college, I was no longer competing in the pre-medical arms race of résumé stacking and accumulating hours. Now, as many of my peers at Michigan State approach graduation, what was once the traditional moment to apply to medical school has shifted. Instead of deciding whether to take a gap year, more and more are deciding how many they need just to remain competitive.

Taking a gap year no longer feels like a choice for personal growth or exploration. It is increasingly treated as a requirement, somethinag applicants do because they must, not because they want to. What is often presented as enrichment is beginning to function as an expectation. The average age of medical school matriculants continues to rise, and gap years, once described as optional periods of development, are becoming normalized across the admissions landscape.

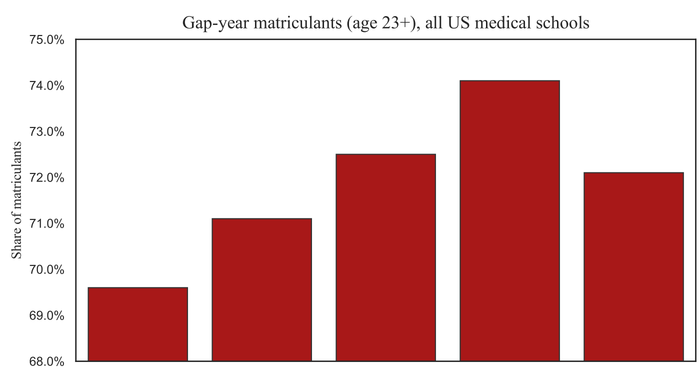

Figure 1. U.S. medical school matriculants aged ≥23 years, 2021–2025 (AAMC, 2023b, 2024b, 2025b) (See Appendix B for more details).

Nearly three quarters of recent medical school matriculants are now 23 or older. Because most students graduate college at 21 or 22, matriculating at 23 or older

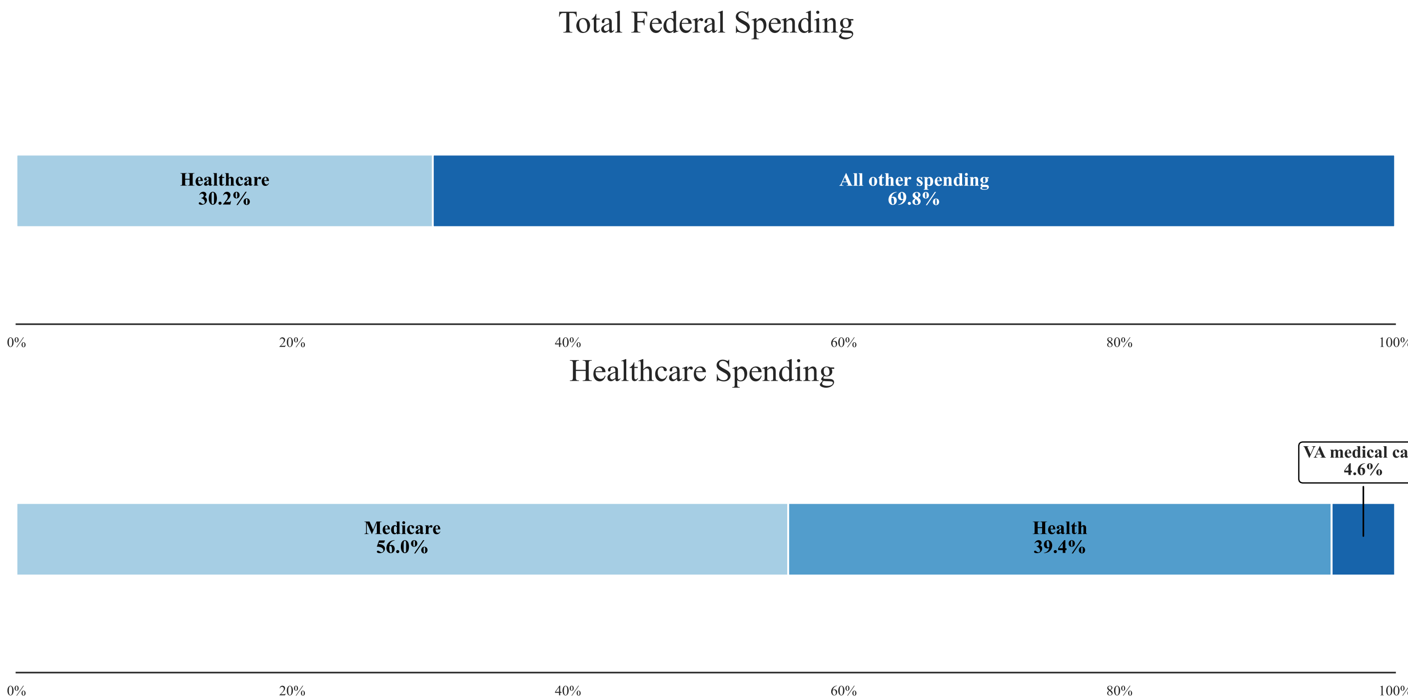

Figure 2. Federal spending by major category and breakdown of healthcare expenditures, fiscal year to date (USDT, 2025).

typically reflects at least one year between undergraduate graduation and medical school entry. In 2021, that figure stood at 69.6 percent. By 2024, it had climbed above 74 percent (Figure 1). The direct transition from undergraduate study into medical school is increasingly the exception rather than the rule. This is not a new phenomenon. As early as 2017, 62.6 percent of entering MD students reported taking at least one gap year (AAMC, 2024a). What was once a majority has steadily moved toward near universality.

Delayed entry into training does not simply alter personal timelines. It shifts when physicians begin practicing and how long they ultimately serve. That timing matters because medical training in the United States is not a private enterprise. It is publicly subsidized at multiple stages.

The Public Investment

So far this fiscal year, roughly one in three federal dollars has gone to healthcare, making it the single largest area of public investment (Figure 2). Medical education operates within that publicly financed system. Federal dollars support medical schools directly and subsidize residency training through graduate medical education funding. Federal support reaches medical training through multiple channels (NIH, 2025; USDE, 2025a; USDHHS, 2025; Heisler et al., 2025). Both undergraduate medical education and graduate medical education depend substantially on public dollars.

Federal and State Funding For Medical Schools

Despite the rising cost of tuition, student tuition and fees account for only about 5 percent of recorded medical school revenue. In contrast, public sources of revenue such as federal grants and contracts comprise roughly 14 percent, with another 8 percent from government and parent support (AAMC, 2024c). Much of this public funding flows through biomedical research. The National Institutes of Health invests roughly $48 billion annually in medical research, most of it awarded as grants to universities and medical schools (NIH, 2025). While not allocated specifically for classroom instruction, these grants finance faculty positions, laboratories, and research infrastructure that underpin medical school overhead (NIH, 2024, Section 7.9.1).

States also contribute directly to undergraduate medical education. Ohio's Clinical Teaching Support appropriations allocate over $33 million annually across public medical colleges to subsidize faculty time and clinical training during the clinical years (Bradford, 2025).

Federal and State Funding for Residency Training

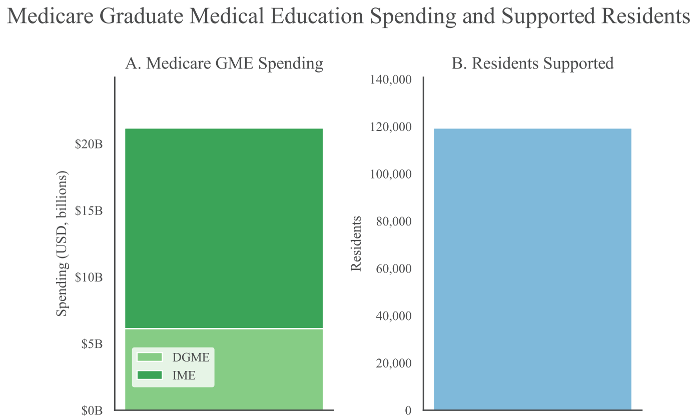

Figure 3. Medicare Graduate Medical Education (GME) spending and resident positions supported, FY2023. (A) Medicare GME spending totals $21.2 billion in FY2023, including Direct GME (DGME) and Indirect Medical Education (IME) payments. (B) Medicare GME supports 119,328 resident physicians in full-time equivalent (FTE) positions. Values reflect FY2023 totals (Heisler et al., 2025).

Public subsidization is even more explicit at the residency stage. Medicare is the largest single source of federal graduate medical education (GME) support with payments in 2023 totaling approximately $21.2 billion, between Direct GME (DGME) and Indirect Medical Education (IME) payments (Figure 3). DGME payments compensate teaching hospitals for resident salaries and supervisory costs, while IME payments are given to account for higher indirect patient care costs (CMMS, 2025; Heisler et al., 2025). These payments operate under statutory formulas and caps, linking public dollars directly to the training pipeline in a structured, policy defined way (CMMS, 2025).

Beyond Medicare, state Medicaid also contributes to GME funding. Medicaid GME payments vary widely across states, but national estimates place spending in the range of several billion dollars annually (Heisler et al., 2025). In Michigan, the publicly reported Medicaid GME pool distributes tens of millions of dollars annually to major teaching hospitals, illustrating how state policy directly finances residency training capacity (MDHHS, 2024).

Public Financing of Medical Students

At the student level, the public finances medical education directly. Graduate and professional students may borrow up to $20,500 per year at a fixed interest rate of 7.94 percent and can borrow up to the full cost of attendance at 8.94 percent through federal loan programs (USDE, 2025a, 2025b). Unlike private lenders, federal programs guarantee access to capital, standardize terms, fix rates for the life of the loan, and absorb default risk, placing the federal government in the position of financier and insurer of medical training.

Public dollars also directly purchase future service. Military Health Professions Scholarship Programs cover full tuition and required fees while providing a monthly stipend during training (U.S. Air Force, 2025). Federal workforce programs administered through the Health Resources and Services Administration similarly fund scholarships and loan repayment in exchange for service in underserved areas (HRSA, 2025).

Across institutions, hospitals, and individual students, medical training is deeply embedded in public finance. Federal and state dollars subsidize research infrastructure, fund residency positions, guarantee student lending, and in some cases directly purchase future service. The pathway to becoming a physician is not one that is paid for solely by those who chose to walk it. Each and every step is paved and sustained by taxpayer capital. The public at large is investing in the years of future clinical service of every physician. The longer it takes a physician to start practicing, the smaller the return on that public investment becomes.

The ROI: Physician-Years

When the public finances the training of a physician, it is not merely funding a degree. It is investing in "physician-years," the cumulative years of clinical service each trained doctor will provide over the course of their career. A physician-year is one year of direct patient care delivered by a fully trained attending physician. Therefore, the total physician-years available from an individual physician can be expressed as:

$$\textit{Physician-Years} = \textit{Retirement Age} - \textit{Attending Age}$$

A physician becomes an attending upon completion of residency. Primary care physicians typically complete training three years after medical school graduation and retire from direct patient care at a median age of roughly 65 (Patterson et al., 2016). When those boundaries are applied to observed and projected medical school graduation ages, between 2019 and the projected 2028 cohort, mean physician-years decline from a high of 34.36 to 33.96 years (Figure 4).

Direct Loss: System-Level Service Contraction

That 0.40-year reduction may appear marginal, but nationally, it represents thousands of full professional lifetimes of care that will never be delivered. With total U.S. medical school enrollment at 100,723 students (AAMC, 2025c), a 0.40-year reduction translates to more than 40,000 physician-years of future service forfeited across currently enrolled medical students.

If the average graduation age were to increase by a full year the loss would be equivalent to eliminating roughly 2,900 full primary care careers from the workforce, assuming an average 34-year practice span.

Indirect Loss: Burnout and Workforce Attrition

The calculation above assumes continuous practice until retirement. In reality, not all physicians remain in full-

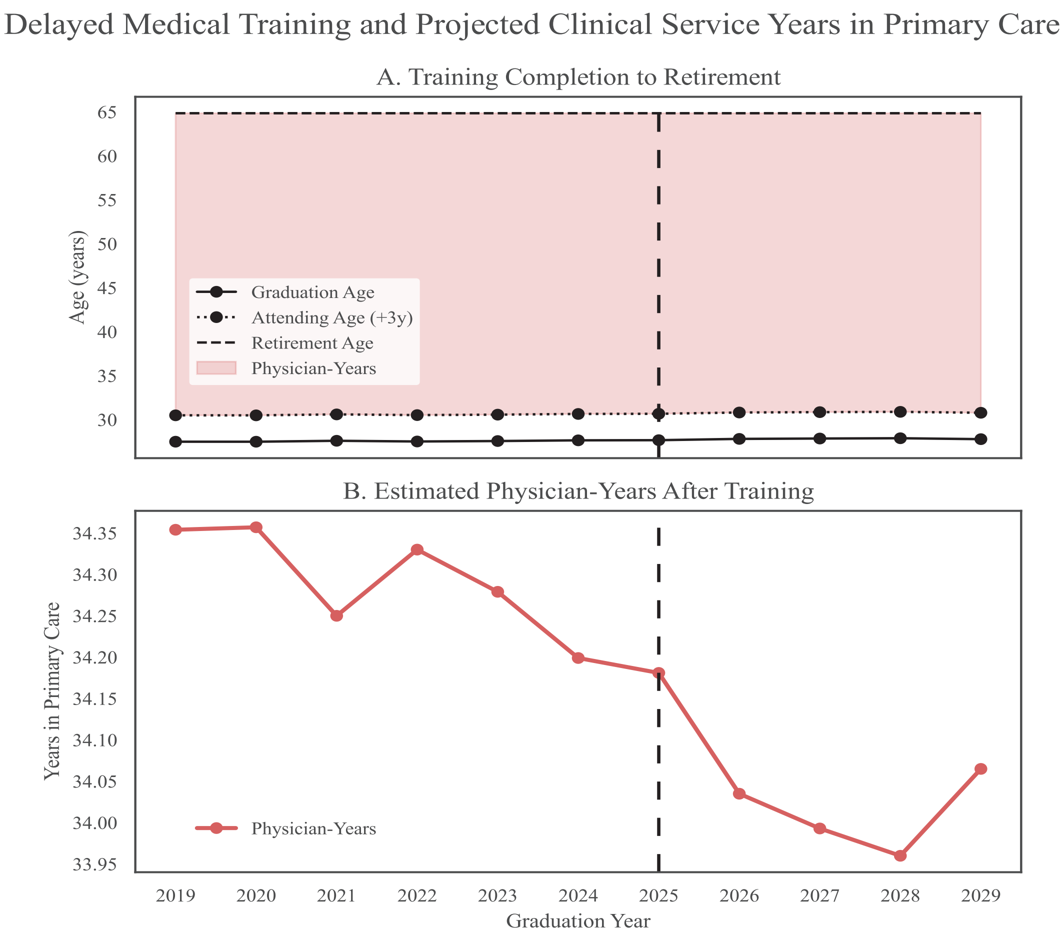

Figure 4. Training completion age, retirement age, and projected physician-years in primary care, 2019–2029 (AAMC, 2023a, 2025a, 2025b; Petterson et al., 2016) (See Appendix B for calculation details).

time clinical care for the entirety of their careers. Burnout remains prevalent. In a Veterans Health Administration workforce study, primary care physicians exhibited some of the highest burnout rates, rising from 46.2 percent in 2018 to 57.6 percent in 2022, with partial improvement in related measures by 2023 (Mohr et al., 2025). Excessive workload, administrative burden, and insufficient recovery time are commonly cited contributors (AMA, 2025).

Importantly, the physicians of today reporting high burnout completed training before gap years became as normalized as they are now. The modern admissions system increasingly selects for prolonged premedical timelines characterized by competitive credential accumulation, extended unpaid clinical work, and delayed financial stability. Sustained high-pressure performance prior to entry into practice may compound stress before physicians begin practicing independently.

If physicians enter the workforce later and already fatigued, two effects compound:

1. Fewer physician-years due to delayed entry.
2. Greater risk of reduced clinical hours, transition to non-clinical roles, or earlier exit from practice.

The system therefore faces not only direct loss from delayed entry, but potential attritional loss from diminished career longevity.

Medical School (Ad)missions: Having Your Cake and Eating It Too

Across the country, medical schools articulate a clear mission: to train physicians who reflect and serve their communities. Mission statements routinely invoke diversity, health equity, rural care, and service to underserved populations. Of the 176 U.S. MD-granting schools, 99 explicitly reference diversity and 47 specifically mention service to underserved or rural communities in their mission statements (AAMC, 2023c).

At face value, the commitment is clear. Yet something does not line up.

The modern admissions landscape increasingly normalizes one, two, sometimes three gap years between college and medical school. Applicants are incentivized to accumulate low paid clinical work, unpaid research, and volunteer experiences that enhance competitiveness while delaying financial stability.

Who can afford that delay?

Not students who must begin earning immediately. Not those supporting families. Not those without the option of living at home rent free. The capacity to tolerate prolonged low income becomes a socioeconomic filter. By rewarding extended credential accumulation, the system advantages applicants with financial insulation and disadvantages those without it.

Primary Care and the Self Selection Problem

The same misalignment appears in the primary care workforce. The AAMC projects a shortage of 20,200 to 40,400 primary care physicians by 2036, with rural and underserved communities most affected (AAMC, 2024d). Yet primary care remains among the least competitive residency matches, with fewer applicants per position and persistent unfilled slots (NRMP, 2024, 2025).

That reality is hard to reconcile with the fact that 65 of 176 U.S. MD-granting schools explicitly reference primary care, community, or rural practice in their mission statements (AAMC, 2023c).

Schools state that they value community physicians. The admissions arms-race rewards something else.

An environment that incentivizes prolonged metric optimization may also favor applicants oriented toward competitive specialty pathways. If admissions were primarily selecting for sustained commitment to primary care, those positions would not remain persistently less competitive and prone to unfilled slots (NRMP, 2025).

Extended gap years favor applicants who strive to chase publications, prestigious research roles, and increasingly optimized metrics. By rewarding the maximization of competitiveness, admissions may disproportionately elevate applicants positioned for specialty competitiveness while filtering out those more likely to enter primary care or return to underserved communities. The pattern becomes self reinforcing:

- Missions emphasize community need.
- Admissions reward extended optimization.
- Financially insulated applicants disproportionately matriculate.
- Competitive specialty pursuit remains attractive.
- Primary care shortages persist despite mission statements.

The system attempts to maximize prestige and social accountability simultaneously, pursuing diversity alongside elite metrics, rural representation alongside research productivity, and community physicians alongside top board scores.

It is trying to have it both ways.

Premeds: The Front End Bottleneck

In the 2025–2026 cycle, more than 54,000 applicants competed for U.S. medical school seats, and only about 43 percent ultimately matriculated (Figure 5; AAMC, 2025c). The majority of applicants, including reapplicants, don't get in.

In any given cycle, admissions operates as a zero sum tournament. For one applicant to secure a seat, others must not. As acceptance rates decline and applicant numbers rise (Figure 5; AAMC, 2025c), gap years shift from optional exploration to strategic necessity. They no longer function primarily as time for reflection, growth, or maturity. They function as competitive optimization windows.

Clinical hours, research publications, service roles, leadership titles, second applications. In an arms race, no credential confers durable advantage, because competitors accumulate the same signals in response. The timeline stretches not because students are unsure, but because the system rewards more. When the same accolades are assembled in the same sequence for the same signaling purpose, the experience becomes standardized rather than developmental.

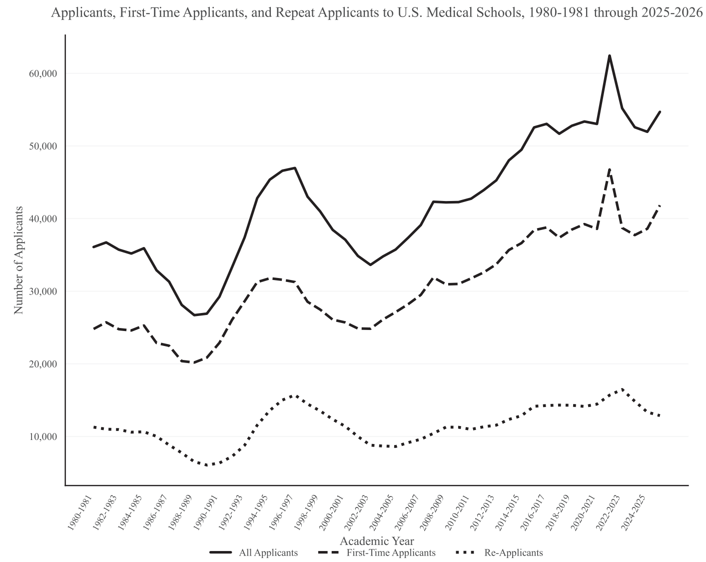

Figure 5. Applicants, First-Time Applicants, and Repeat Applicants to U.S. Medical Schools, 1980–1981 through 2025–2026. Recreated from AAMC FACTS Table 1 data (AAMC, 2025d).

The result is predictable: mutually assured escalation, résumé inflation, financial exposure, deferred earnings, psychological strain, and multi-year uncertainty, all the while applicants grow older and more credentialed without becoming more mature.

Attrition and Human Capital

A system in which fewer than half of applicants matriculate in a given year necessarily produces attrition over time. Not everyone has the means to reapply indefinitely. Some leave medicine entirely, either voluntarily or because they cannot afford to continue.

Certainly those individuals are not unmotivated or unqualified. Just to make it to the application stage, they completed prerequisite science coursework, sat for the MCAT, and sustained years of service and research engagement. They are high-achieving, science-trained, service-oriented students who invested years of their lives into a single professional trajectory.

When applicants pivot after multiple cycles, the result is structural inefficiency. Aggregated across applicants, the lost time accumulates not as forgone physician-years but as unrealized academic-years: years spent in admissions limbo that could have been redirected earlier to contributions across science, engineering, public health, industry, or research. Delayed filtering delays the reallocation of academic talent: an internal brain drain. The public subsidizes medical education because it values physician labor, yet this upstream pathway absorbs thousands of academic-years from individuals drawn from the upper tail of academic and scientific achievement, years that never translate into clinical practice and delay potential contributions elsewhere.

The Solution: Decoupling Time From Advantage

Medical schools state that they value diversity, service, and primary care. Yet the admissions arms race disproportionately rewards applicants who can afford prolonged, low income optimization. If the goal is both social accountability and workforce efficiency, the structure must change.

Two reforms follow:

1. "Normalize" the Gap Year

Gap years do not need to disappear, but they must stop conferring competitive advantage. Schools can accomplish this by publishing explicit diminishing returns for common escalation signals: capping the evaluative weight of post-graduation research beyond a defined duration, standardizing how clinical hours above a competency threshold are considered, and clearly stating that excessive credential accumulation does not increase admissions probability.

The purpose is not to eliminate development, but to decouple time from advantage. When additional years no longer systematically improve admissions odds, escalation slows and delayed entry will naturally reach an equilibrium.

2. Conditional Acceptance With Built In Development

Schools can reduce uncertainty by offering conditional acceptance during college, followed by a structured development year prior to matriculation. Programs at Northeast Ohio Medical University illustrate this model, allowing students to reserve a future seat and either matriculate immediately or defer to a later cohort (Moses et al., 2023).

This development year can remain intentionally flexible, allowing students to work, save money, or pursue service or clinical engagement without admissions penalty. Schools select mission-aligned students earlier through provisional admission rather than relying exclusively on post-graduation credential accumulation.

Realigning Incentives in the Premedical Pipeline

This manuscript began with rising matriculation age and declining physician-years. It traced the public financing of medical education and quantified the system-level loss from delayed entry.

At the center lies a simple asymmetry:

- The public invests early.
- The system delays output.
- Applicants absorb the risk.

Because medical education is publicly subsidized, efficiency is not merely a private concern. Delayed entry reduces cumulative service. At the same time, competitive escalation filters by financial insulation, not community need or mission alignment. These are not separate problems but two expressions of the same structure: time becomes a purchasable advantage, and workforce supply is reduced in the process. The admissions system cannot simultaneously maximize prestige, prolong uncertainty, and claim to address physician shortages.

The purpose is not to eliminate gap years or discourage exploration. Time away from direct training can be restorative, exploratory, or necessary. But it should be chosen, not compelled. A gap year should feel like freedom, not obligation.

Physician shortages and workforce imbalances have been well documented. Delayed entry cannot be treated as neutral. The pipeline does not begin at residency. It begins with the premedical pathway. Reform will require broader coordination, but it starts with individual medical schools, because they control admissions incentives and therefore the structure of delay itself.

Right now, that front end is where the inefficiency begins.

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Appendix A: Calculations

Calculation of Federal Healthcare Spending Share

Federal healthcare spending was estimated from FY2026 year-to-date (YTD) obligated shares reported in the USAspending Budget Function Explorer (USDT 2025).

Healthcare was defined as the sum of the Medicare and Health budget functions plus the hospital and medical care sub-function within Veterans Benefits and Services. Veterans medical spending was isolated because the Veterans Benefits and Services function includes both healthcare and non-medical income support.

Extracted FY2026 shares:

- Medicare: 16.9%
- Health: 11.9%
- Veterans Benefits and Services: 4.6%
- Hospital and medical care sub-function: 30.3%
    - Veterans healthcare share = 4.6% × 30.3% = 1.39%

Total federal healthcare share = 16.9% + 11.9% + 1.39% = 30.2% of FY2026 YTD federal outlays

Replication: retrieve FY2026 shares for Medicare, Health, and Veterans Benefits from the USAspending Budget Function Explorer, obtain the VA hospital and medical care sub-function share, multiply to isolate VA healthcare, then sum the three components.

Source: (USDT 2025)

Calculation of Michigan Medicaid Graduate Medical Education (GME) Pool Total

Michigan Medicaid Graduate Medical Education funding was estimated using the publicly available 2024 GME Pool distribution document published by the Michigan Department of Health and Human Services (MDHHS, 2024).

The document reports facility level payments across three columns:

- GMEH Payments
- Podiatrist Payments
- GMEH Dental and GMEP Payments

To calculate total statewide GME pool distributions, the reported totals from each column were summed.

GMEH Payments: $142,734,919
Podiatrist Payments: $617,968
GMEH Dental and GMEP Payments: $19,535,420

Total Michigan Medicaid GME Pool Payments:

$142,734,919 + $617,968 + $19,535,420 = $162,888,307

Rounded total reported in text: approximately $163 million.

Replication: retrieve the "2024 Graduate Medical Education Pool" distribution document from the Michigan Department of Health and Human Services website, extract the statewide totals listed for GMEH, Podiatrist, and GMEH Dental/GMEP payment categories, and sum the three values.

Source: (MDHHS, 2024)

Calculation of mean of reported annual medians age of Retirement of Primary Care Physicians

Retirement age was estimated from Petterson et al. annual median retirement ages by taking the simple arithmetic mean of the yearly medians reported for 2010 to 2013 in the `median_retire_age_direct` column.

Extracted annual medians (direct patient care):

- 2010: 64.7
- 2011: 64.9
- 2012: 65.1
- 2013: 64.7

Mean retirement age:

(64.7 + 64.9 + 65.1 + 64.7) / 4 = 64.85 years

Replication: retrieve the annual median retirement ages for primary care physicians from Petterson et al. for 2010 to 2013, sum the four median values, and divide by 4 to obtain the mean retirement age used in the analysis.

Source: (Petterson et al 2016)

The 40,000 Physician-Years National Extrapolation Calculation

Source of 0.40-year reduction:

From Figure 4, mean physician-years decline from 34.36 years (2019 cohort) to 33.96 years (projected 2028 cohort).

Decline in physician-years per student:

34.36 – 33.96 = 0.40 years

National extrapolation:

Total forfeited physician-years =

(Decline in physician-years per student) × (Total enrolled students)

= 0.40 × 100,723

= 40,289.2 physician-years

≈ 40,000 physician-years (rounded to nearest thousand)

Replication:

1. Retrieve mean physician-years for 2019 and projected 2028 from Figure 4.
2. Subtract 33.96 from 34.36 to obtain the per-student decline of 0.40 years.
3. Multiply 0.40 by total U.S. MD enrollment (100,723, AAMC 2025c).
4. Round to the nearest thousand for narrative reporting.

Sources: (Figure 4; AAMC, 2025c).

The "2,900 Full Careers" Calculation

Derivation of mean modeled career length:

From Table 2 (Panel B of Figure 4), physician-years by cohort (2019–2029) are:

34.35, 34.36, 34.25, 34.33, 34.28, 34.20, 34.18, 34.04, 33.99, 33.96, 34.07

Mean physician-years across 2019–2029:

(34.35 + 34.36 + 34.25 + 34.33 + 34.28 + 34.20 + 34.18 + 34.04 + 33.99 + 33.96 + 34.07) ÷ 11

= 376.01 ÷ 11

= 34.18 years

Rounded for interpretability and conservative reporting:
34.18 ≈ 34 years

This value represents the modeled average duration of direct patient care after training and before retirement.

Physician-years lost from a 1.00-year reduction applied nationally:

Physician-years lost =
1.00 × 100,723
= 100,723 physician-years

Convert physician-years into equivalent full careers:
Equivalent full careers =
100,723 ÷ 34
= 2,962.44
≈ 2,900 full careers

Rounded to nearest hundred for narrative clarity.

Replication:

1. Retrieve physician-years for 2019–2029 from Table X2.
2. Compute the arithmetic mean of those 11 values.
3. Round the mean to 34 years for modeling clarity.
4. Multiply total enrollment (100,723, AAMC 2025c) by a 1.00-year change.
5. Divide by 34 to convert total physician-years into equivalent full careers.

Sources: (Table 2; AAMC, 2025c).

Calculation of Mission Statement References to Diversity, Underserved or Rural Service, and Primary Care or Community Practice

Mission statements for U.S. MD-granting medical schools were obtained from the AAMC MSAR mission statement compilation (AAMC, 2023c). Each listed school was treated as a single observation.

Three binary indicators were defined:

Diversity reference: mission text contains any of the terms "diversity," "diverse," "inclusion," "equity," or "disparities."

Underserved or rural service reference: mission text mentions "underserved" or "rural."

Primary care or community practice reference: mission text contains "primary care" or "community."

Each mission statement was reviewed once and coded for the presence of either of the three categories. Schools were counted once per category regardless of multiple mentions within the same mission.

Counts were summed across all schools in the compilation.

Extracted counts:

- Total MD-granting schools: 176
- Schools referencing diversity: 99
- Schools referencing underserved or rural service: 47
- Schools referencing primary care or community: 65

Share referencing diversity = 99 / 176 = 56.3%

Share referencing underserved or rural service = 47 / 176 = 26.7%

Share referencing primary care or community = 65 / 176 = 36.9%

Replication: obtain the AAMC MSAR mission statement compilation, review each school's mission text, assign binary indicators based on the specified keywords, and sum counts across schools.

Source: (AAMC, 2023c)

Acceptance rate derivation using AAMC FACTS Table 1 (2025–2026)

Acceptance rate definition:

Acceptance rate = Matriculants / Applicants
FACTS Table 1 values (2025–2026):
Applicants AA = 54,699
Matriculants MM = 23,440
Acceptance rate =23,440 / 54,699= 0.4286 = 42.86%≈43%

Replication: Retrieve Applicants and Matriculants for 2025–2026 from AAMC FACTS Table 1, divide matriculants by applicants, multiply by 100 to express as a percent, and round to the nearest whole percent to match the manuscript text.

Source: (AAMC, 2025c)

Appendix B: Charts and Figures

All data and figures and code stored in Google Drive:
https://drive.google.com/drive/folders/1wq43WaIfZSEZX2Tu5c9BfyCZtqaQLuth?usp=sharing

Figure 1-

Percentages were calculated by summing AAMC age-group shares for 23–25, 26–28, and >28 years in each matriculation year. Bars denote annual proportions; values are labeled. Y-axis shown from 68 to 75%.

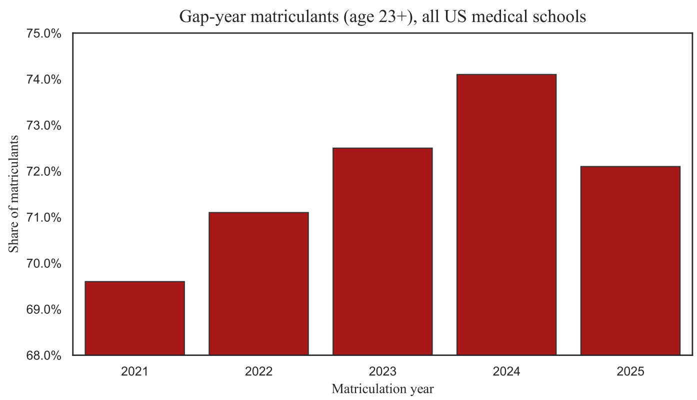


Figure 4 - Training completion age, retirement age, and projected physician-years in primary care, 2019–2029

Physician-years were defined as the expected duration of direct patient care after completion of training and before retirement. For each graduation year:

Physician-years = retirement age – attending age

Attending age was defined as graduation age plus a typical 3-year primary care residency.

<u>Observed graduation age (2019–2025)</u>

Mean graduation age for each year was estimated from AAMC Graduation Questionnaire age-bin distributions (AAMC, 2023a, 2024b, 2025a). Reported bin percentages were converted to an approximate mean using midpoint assumptions:

- Under 24 → 23
- 24–26 → 25
- 27–29 → 28
- 30–32 → 31
- Over 32 → 34

Mean graduation age = Σ(percent_bin × midpoint_bin) / 100

<u>Projected graduation age (2026–2029)</u>

Future graduation ages were projected by shifting AAMC matriculant age distributions (AAMC 2025b) forward by four years (typical medical school duration). Mean matriculant age was estimated from AAMC matriculation age bins using midpoint assumptions:

- Under 20 → 19
- 20–22 → 21
- 23–25 → 24
- 26–28 → 27
- Over 28 → 30

Mean matriculant age = Σ(percent_bin × midpoint_bin) / 100

Projected graduation age = mean matriculant age + 4

Projected graduation years therefore correspond to matriculation years + 4 (e.g., 2022 matriculants → 2026 graduates).

<u>Attending age</u>

Attending age = mean graduation age + 3 years

Three years reflects the standard duration of U.S. primary care residencies (family medicine, internal medicine, pediatrics).

<u>Retirement age anchor</u>

Retirement age was defined as the median age of retirement from direct patient care among U.S. primary care physicians reported by Petterson et al. (2016). The mean of yearly medians (2010–2013) was used as a constant retirement benchmark:

Retirement age ≈ 65.0 years

This value was applied uniformly across graduation cohorts.

<u>Physician-years calculation</u>

For each graduation year:

Physician-years = retirement age – (graduation age + 3)

Example (2025 cohort):
Mean graduation age ≈ 28.1
Attending age ≈ 31.1
Physician-years ≈ 65.0 – 31.1 = 33.9 years

<u>Projection boundary.</u>

The vertical dashed line at 2025 marks the transition from observed graduation ages (AAMC GQ) to projected values derived from matriculant age distributions shifted forward by four years.

<u>Replication.</u>

1. Retrieve AAMC Graduation Questionnaire age-at-graduation bin percentages for 2019–2025.
2. Convert bins to mean graduation age using stated midpoints.
3. Retrieve AAMC matriculant age distributions for 2021–2025 from the 2023 and 2025 Matriculating Student Questionnaire.
4. Convert bins to mean matriculant age using stated midpoints.

5. Add four years to obtain projected graduation ages (2026–2029).
6. Add three years to obtain attending age.
7. Subtract from retirement age (≈ 65) to obtain physician-years.
8. Plot graduation age, attending age, retirement age, and physician-years.

Sources: (AAMC, 2023a, 2025a, 2025b; Petterson et al., 2016)

Appendix C: Additional Figures

Figure 1B: U.S. medical school matriculants aged ≥23 years, 2021–2025. (Non-truncated)

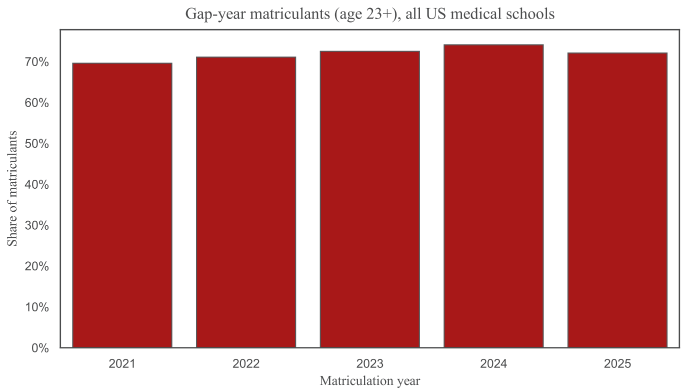
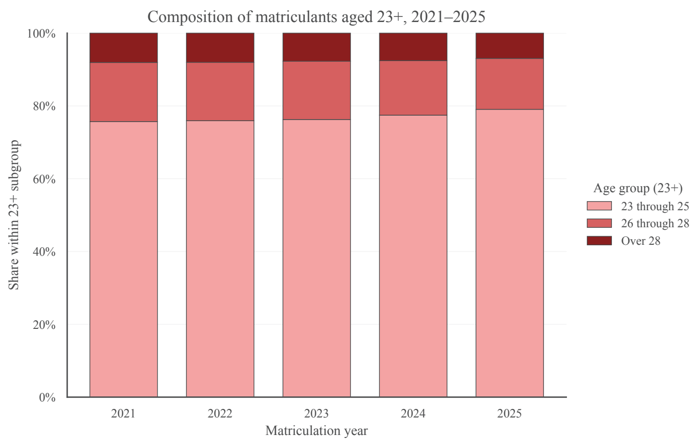


Figure 1C: U.S. medical school matriculants aged ≥23 years, 2021–2025. (Non-truncated,broken down by age group)



Appendix D: Data Tables

Table 1: Derived totals for matriculants aged ≥23 years based on AAMC MSQ age-group distributions, 2021–2025. Corresponds to Figure 1 in the Main Text.

Year	Total 23+ (%)
2021	69.6
2022	71.1
2023	72.5
2024	74.1
2025	72.1

Note: Values calculated by summing AAMC Matriculating Student Questionnaire age categories 23–25, 26–28, and over 28 years (AAMC 2023b, 2024b, 2025b).

Table 2: Modeled Physician-Years and Physician-Months by Graduation Cohort, 2019–2029. Corresponds to Panel B of Figure 4 in the Main Text.

Year	Graduation Age	Attending Age	Physician-Years
2019	27.50	30.50	34.35
2020	27.49	30.49	34.36
2021	27.60	30.60	34.25
2022	27.52	30.52	34.33
2023	27.57	30.57	34.28
2024	27.65	30.65	34.20
2025	27.67	30.67	34.18
2026	27.82	30.82	34.04
2027	27.86	30.86	33.99
2028	27.89	30.89	33.96
2029	27.78	30.78	34.07

Note: See Appendix B: Figure 4 for more information on how each of these values were calculated.