

Unlocking STEM Talent: National and State Insights on Community College Transfer Pathways

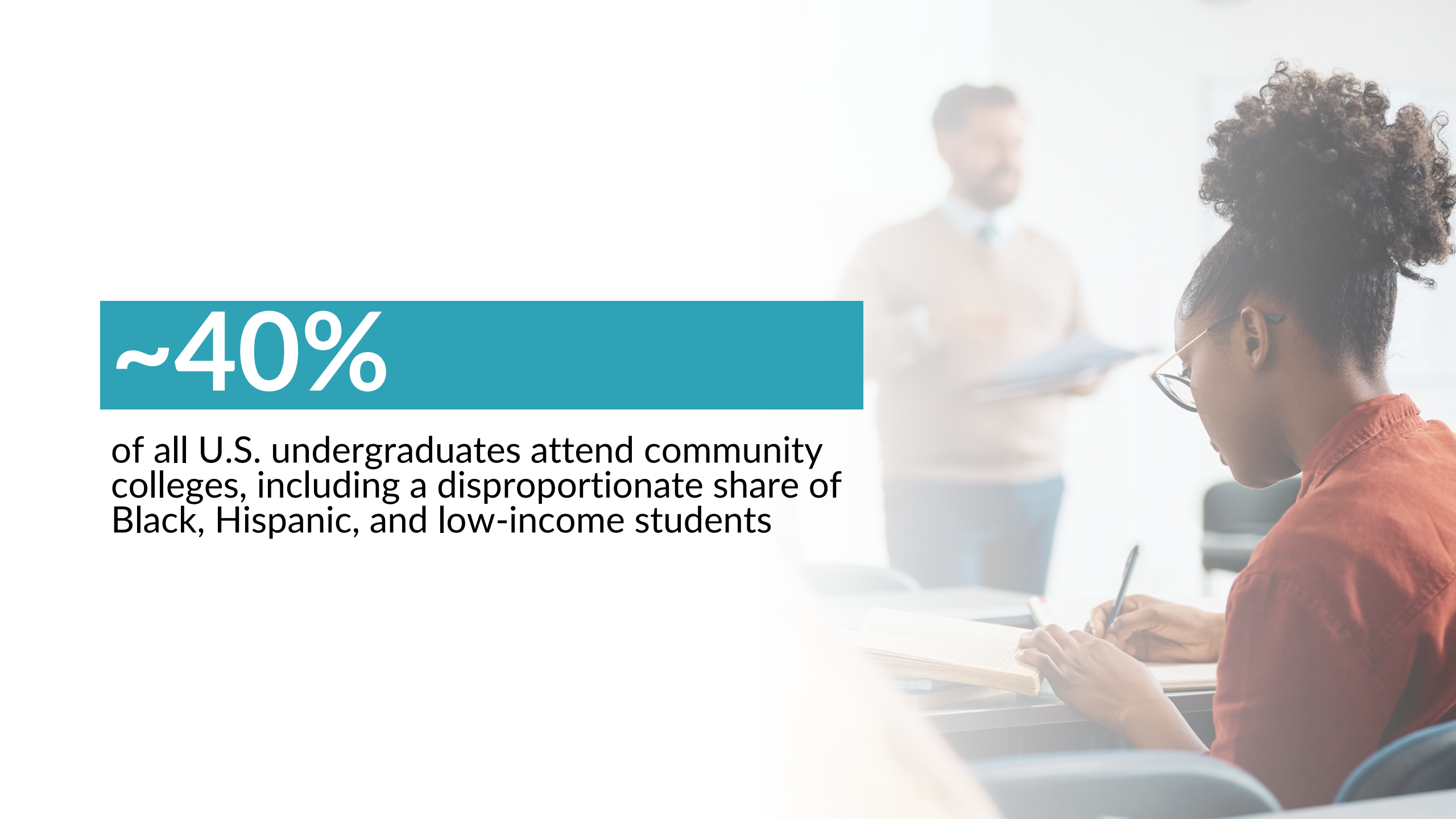
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A group of four students walking away from the camera on a paved path. On the left is a modern building with large glass windows and a metal railing. On the right is a tall, thin tree. The scene is brightly lit, suggesting a sunny day. The students are wearing backpacks and casual clothing.

Why STEM transfer matters

Part 1 | Motivation

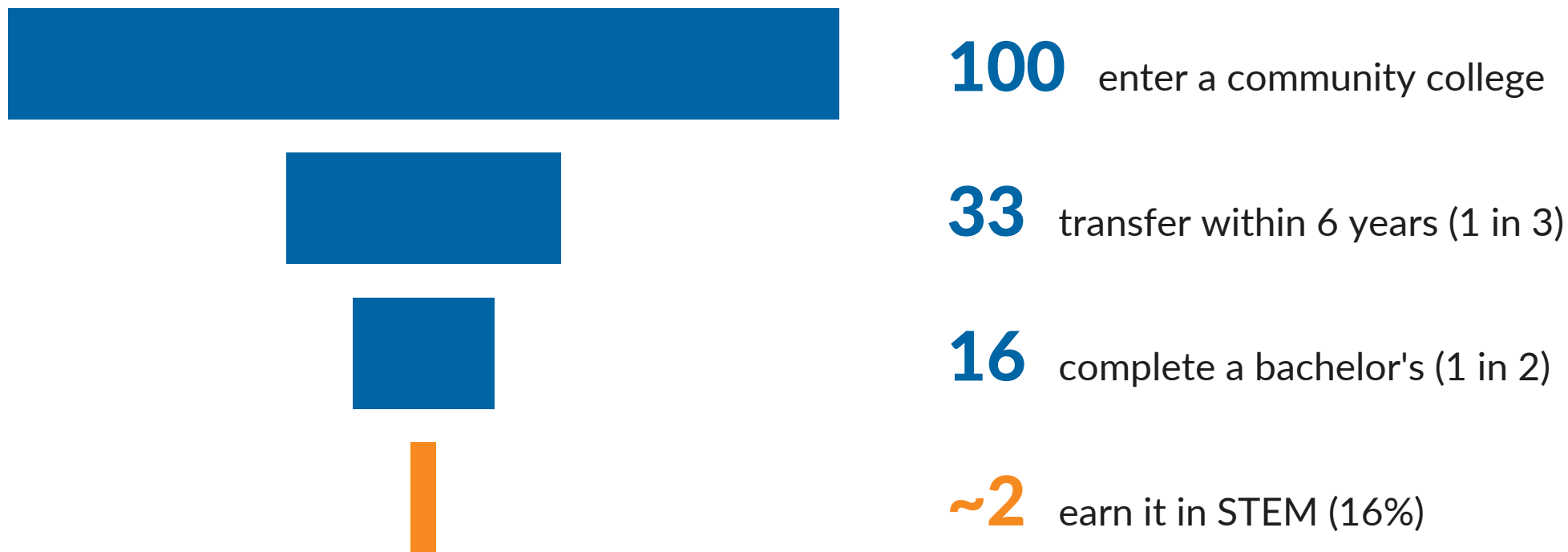


~40%

of all U.S. undergraduates attend community colleges, including a disproportionate share of Black, Hispanic, and low-income students

The pipeline leaks at every stage

Out of every 100 community college entrants



Only 9% of S&E master's recipients in 2016-17 had ever enrolled at a CC (NSC Research Center, 2017)

In tightly sequenced STEM programs, lost credits compound

Only 58%

of CC transfer students were able to transfer more than 90% of their credits

NCES data (Monaghan & Attewell, 2015)

Credits are lost or not applied as prerequisites for upper-level courses



Math requirements not applied on time same for calculus and other gateway courses



Delays propagate through the rest of the major sequence



Completion is delayed timely degree completion is harder

Made worse by **remedial placement** below what students' high school achievement warrants

STEM students must plan early, but the transfer "maze" makes that hard

What students need to do

- Identify their intended major well before transferring
- Complete the right prerequisite sequence for that major, and figure out what those are.



What stands in the way

- Selective admissions and strict rules on which courses count
- Transfer agreements help, but vary across institutions and even across majors
- Departments decide which courses they accept and apply to the degree

The result: a high-stakes transfer "maze," with uncertainty about where students can transfer and which courses they can take with them

Community college transfers perform as well as non-transfer students.

Once they arrive, transfer students have higher first-to-second-year retention (81% vs. 76%) and comparable bachelor's completion rates.

Three questions about STEM transfer pathways

National Student Clearinghouse data on bachelor's completers who entered a four-year institution in 2015-16

1 Contribution

How much do CC transfers add to STEM bachelor's attainment, and how likely are they to complete in STEM compared with non-transfers?

2 Time to degree

How do paths differ for STEM and non-STEM transfer completers, in terms of time to the bachelor's?

3 Graduate school

To what extent STEM transfer bachelor's completers pursue a graduate education?

Across every question:

STEM disciplines

Student groups

Prior DE participation

States

First national and state-by-state look at CC transfer paths in STEM, and first evidence on how many go on to graduate school



Data and approach

Part 2 | Data

Data Source: National Student Clearinghouse Data

Who is in the sample

All students who started at a four-year institution in 2015-16



Completed a bachelor's within six years of four-year entry

Three mutually exclusive groups of completers



- **CC transfers (326k):** Last enrolled at a community college within six years before four-year entry
- **Non-transfers (1,2mm):** No postsecondary enrollment in the prior six years
- **Lateral transfers (195k):** Last enrolled at another four-year institution (not the focus)

1,965 four-year institutions **919** community colleges

Why completers? Field of study is more reliable at completion than declared major. STEM-seeking transfers who did not earn a STEM bachelor's are not observed.

Five STEM fields

Six-digit NCES CIP codes on bachelor's and graduate majors

Biosciences

Biology, genetics, chemistry

CIP 26, some 40

Computer & information sciences

Computer science, data science, IT

CIP 11, some 30

Engineering

Incl. engineering, industrial, auto and aero technologies

CIP 14, 15, 47

Mathematics & statistics

CIP 27

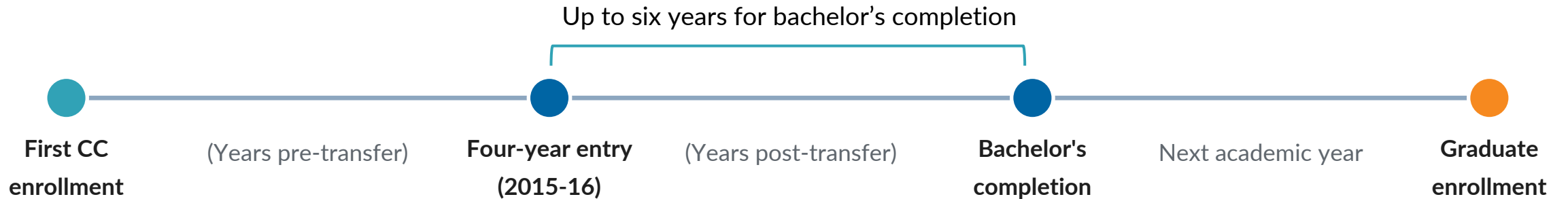
Physical sciences

Geo-, atmospheric, ocean, earth sciences; physics, astronomy

CIP 40, 41



How we measure STEM transfer outcomes



1

Share of bachelor's completers who complete in STEM

- Compared by transfer status:
 - CC Transfers
 - Non-Transfers
 - Lateral Transfers

2

Time to completion

- On time completion: Bachelor's completers who completed within four calendar years
- Years pre-transfer, and years post-transfer (also in calendar years)
- Among CC transfers only; STEM vs. non-STEM

3

Graduate enrollment

- Enrolled in the academic year after the bachelor's
- Any graduate program and STEM programs
- Master's, doctorate, professional, postbacc certificate



Five key takeaways

Part 3 | Findings

Question for you:

What share of STEM bachelor's graduates started at a community college?

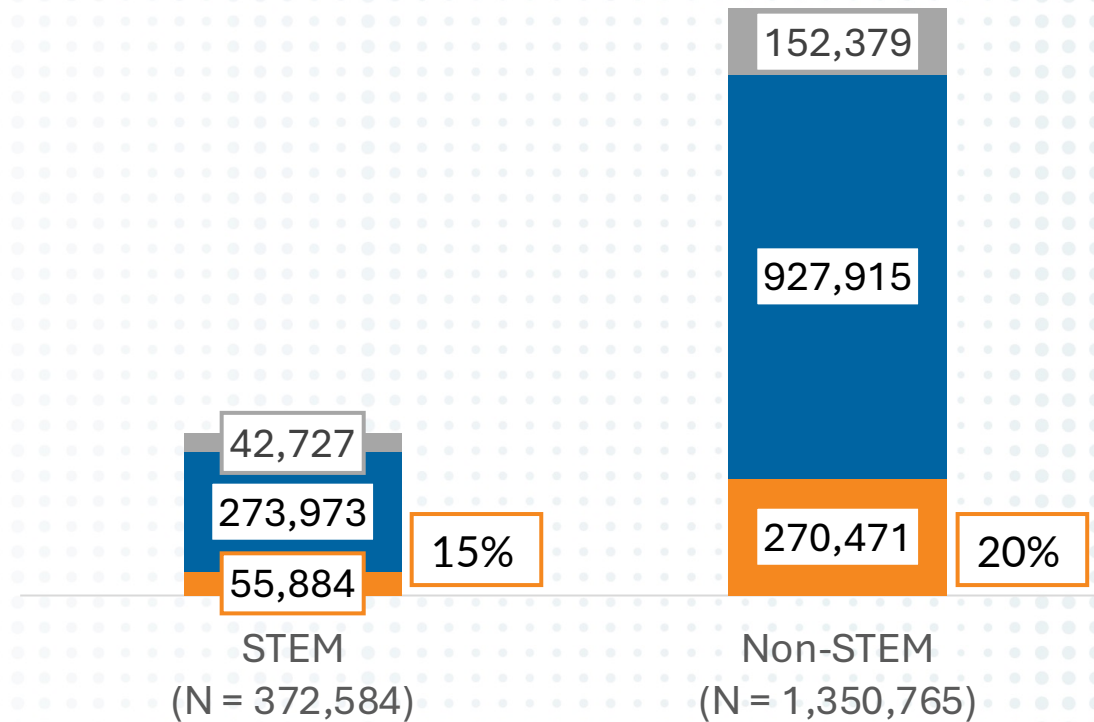


55,800 STEM bachelor's graduates came through CC transfer

If transfer representation were even in STEM and non-STEM, there would be an additional 18.4 thousand transfer students graduating in STEM (instead of non-STEM)

Number of Bachelor's Completers in STEM and Non-STEM Fields, by Transfer Status

■ CC Transfers ■ Non-Transfers ■ Lateral Transfers

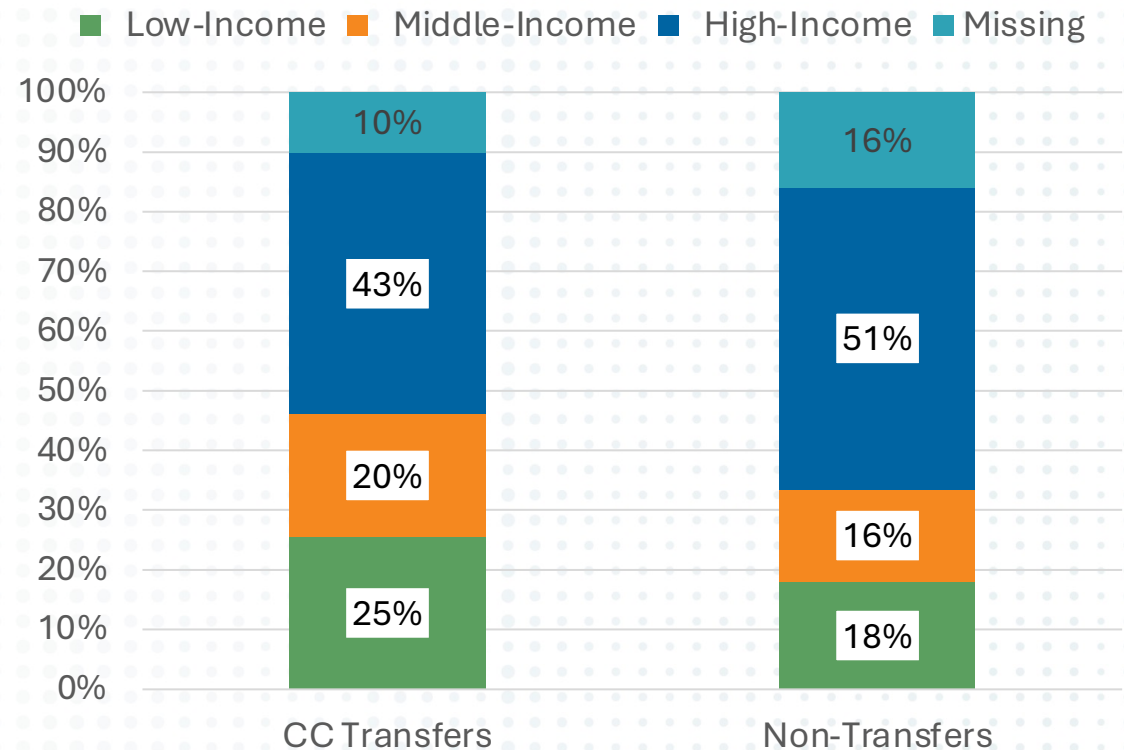


Transfers broaden who earns STEM degrees

Community college transfers bring:

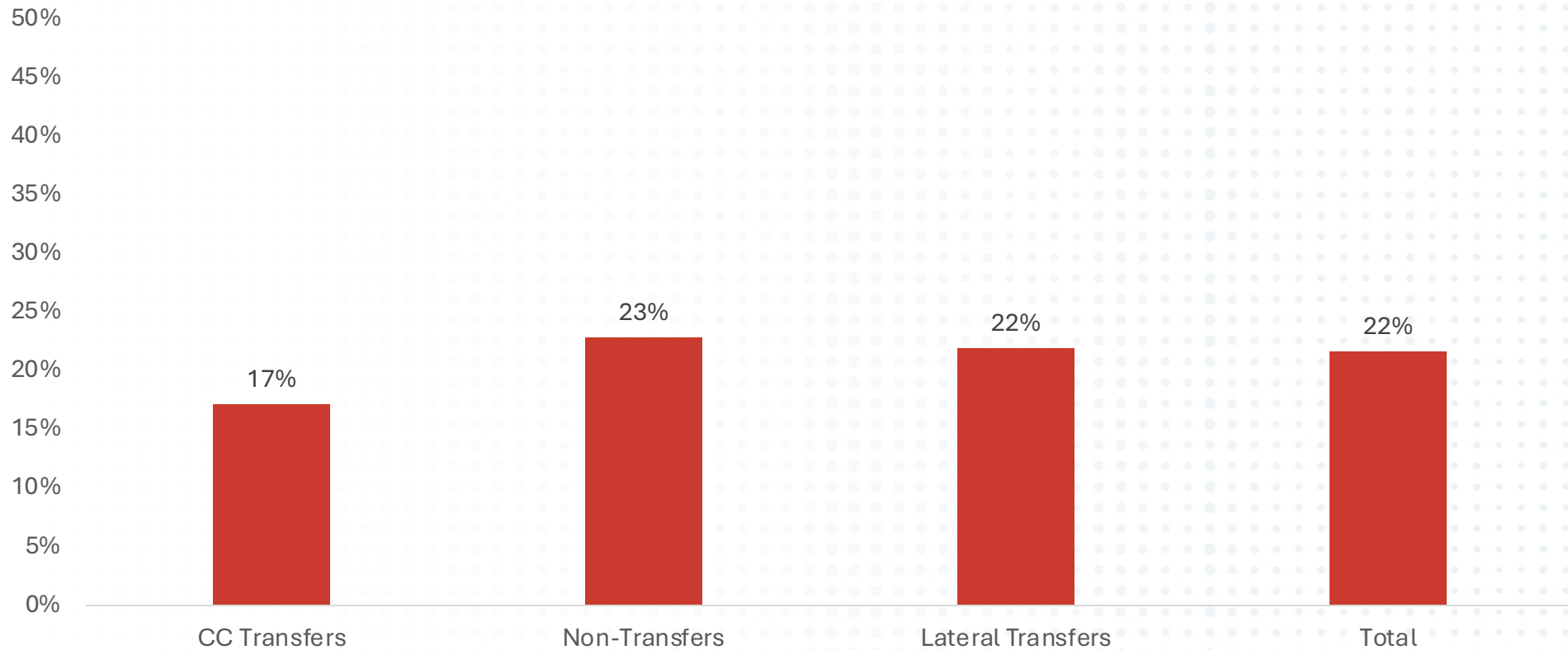
- More income diversity: 45% of transfers come from low- or middle-income neighborhoods vs. 34% of non-transfers.
- Stronger Hispanic representation (14% vs. 10%)
 - But transfer women tend to be underrepresented in STEM, except in the biosciences.
- STEM transfer bachelor's complete in field to non-transfers; engineering is largest (35%).

Income Representation Among STEM Transfer Bachelor's Completers



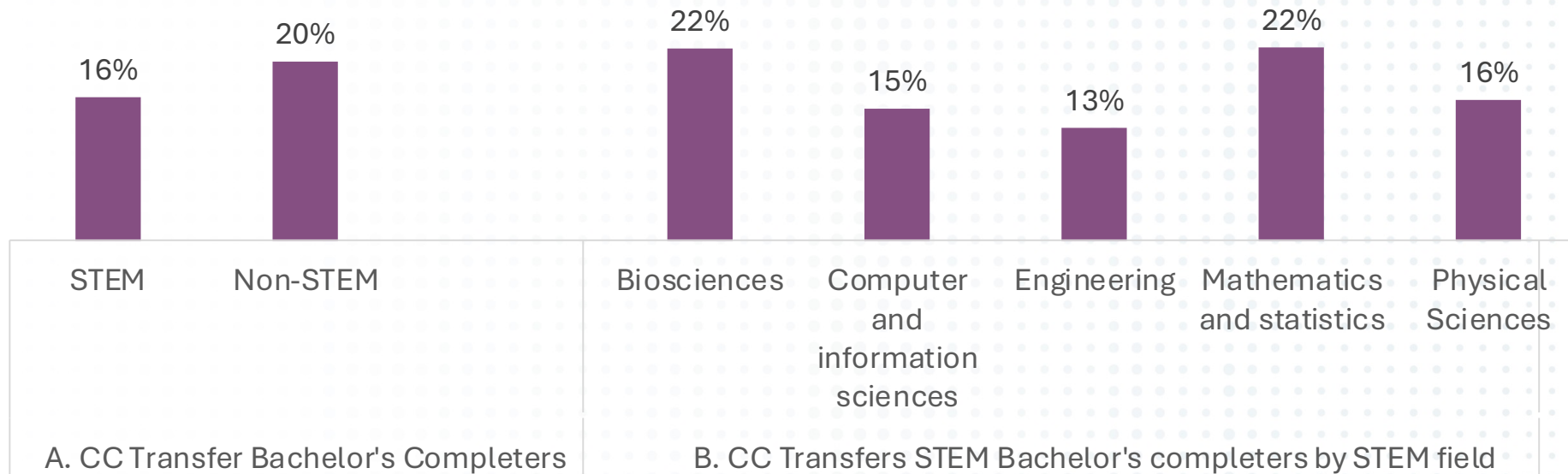
But transfers are less likely to complete in STEM

Share of Bachelor's Completers Who Completed in STEM, by Transfer Status

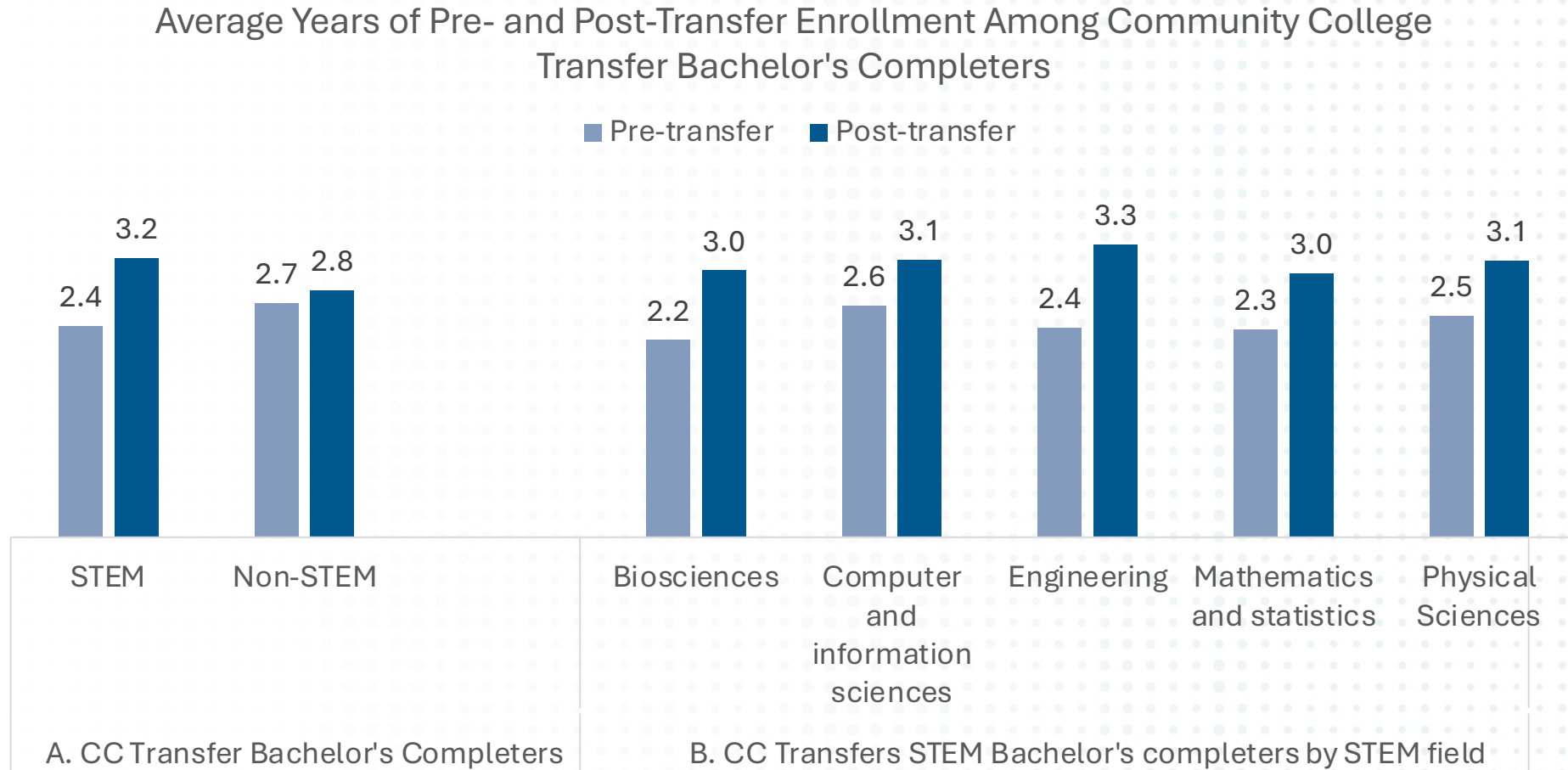


STEM transfer completers are less likely to finish on time

Share of Community College Transfer Bachelor's Completers Who Earned Their Degree Within Four Years (On-Time)

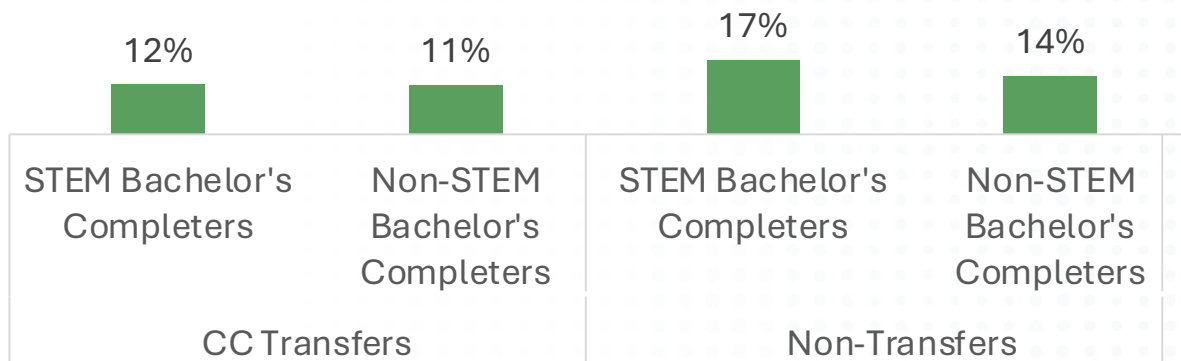


The delay happens after transfer: STEM transfers spend 0.4 more years at the four-year



Transfer graduates are less likely to continue to graduate school

Rates of Enrollment in Graduate School Among Bachelor's Completers, by Transfer Status



12% vs. 17%

Transfer STEM completers were less likely to enroll in a graduate program than the non-transfer

5% vs. 8%

Transfer STEM completers were also less likely to enroll in a STEM program

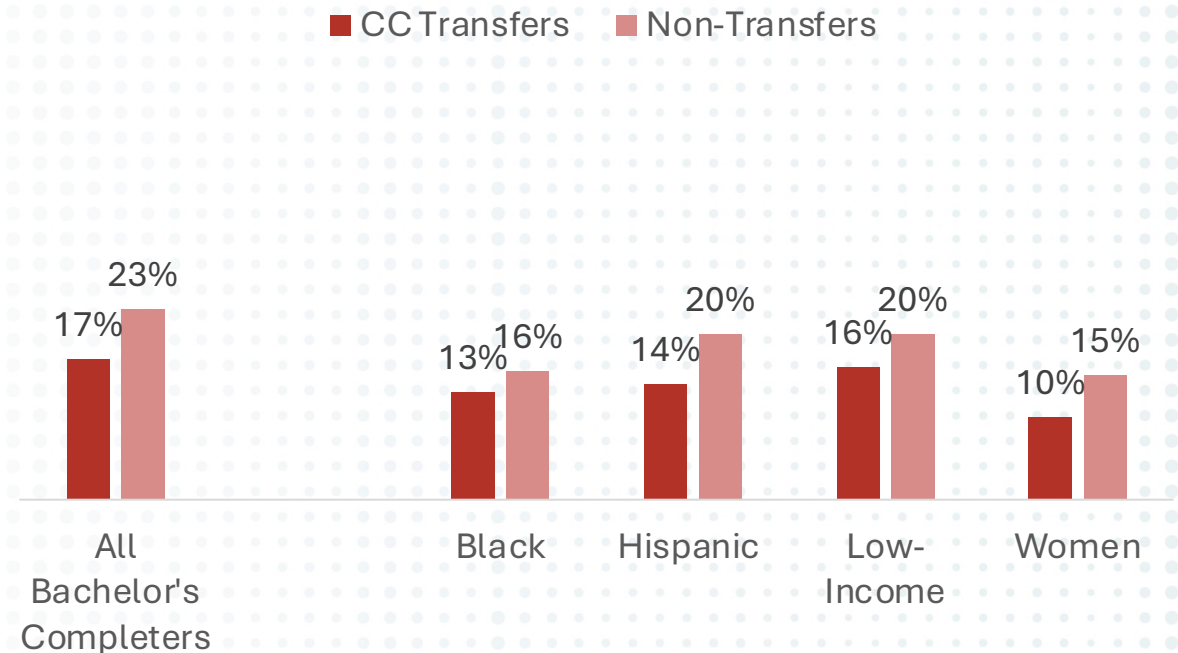
The transfer gap is not unique to STEM

Black, Hispanic, and low-income students face a double barrier. For women, the gap is at STEM completion.

Lower STEM share, slower

- STEM share: Black 13%, Hispanic 14%, low-income 16% (all transfers: 17%)
- On time: Black 12%, Hispanic 11%, low-income 14% (all: 16%)
- More time both before and after transfer

Share of Bachelor's Completers Who Completed in STEM, by Transfer Status and Student Characteristics



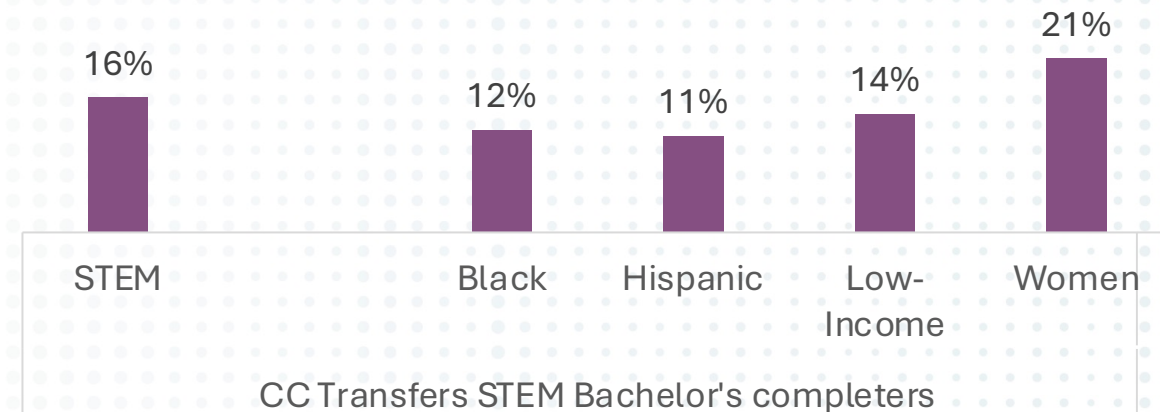


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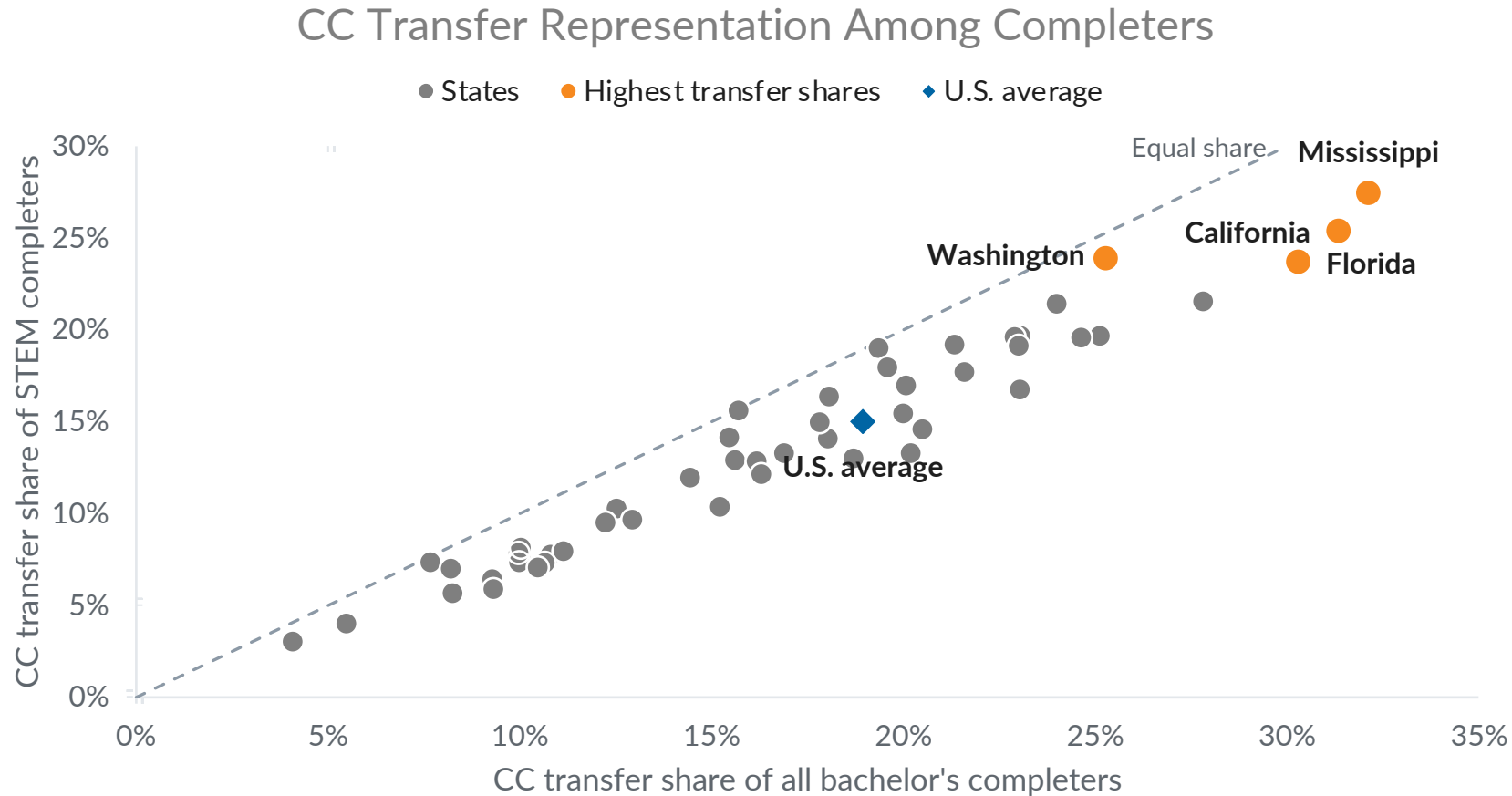
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Share of Community College Transfer STEM Bachelor's Completers Who Completed Within Four Years (On-Time), by Student Characteristics



States where transfers make up more of all graduates also send more transfers into STEM



19 states

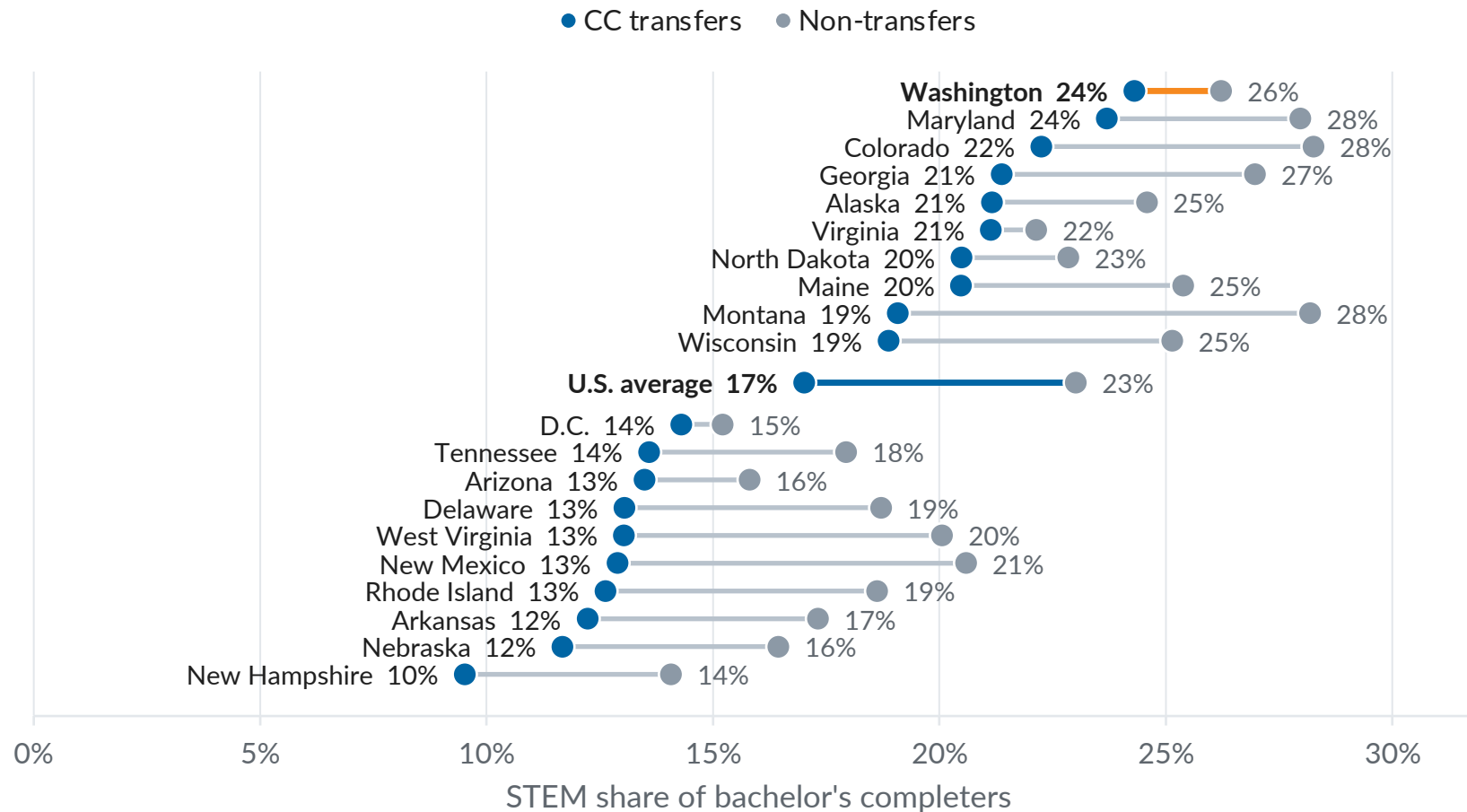
Have a transfer presentation in STEM at 10% or less

~25%

in Mississippi, California, Washington, Florida

States defined by the four-year institution. Wyoming suppressed (fewer than three colleges).

Transfers are less likely to complete in STEM than non-transfers nationwide. But the gaps are smaller in some states.



6 points

the national gap between transfers and non-transfers.

2 points

Washington's transfer vs. non-transfer gap

WA, MD, CO

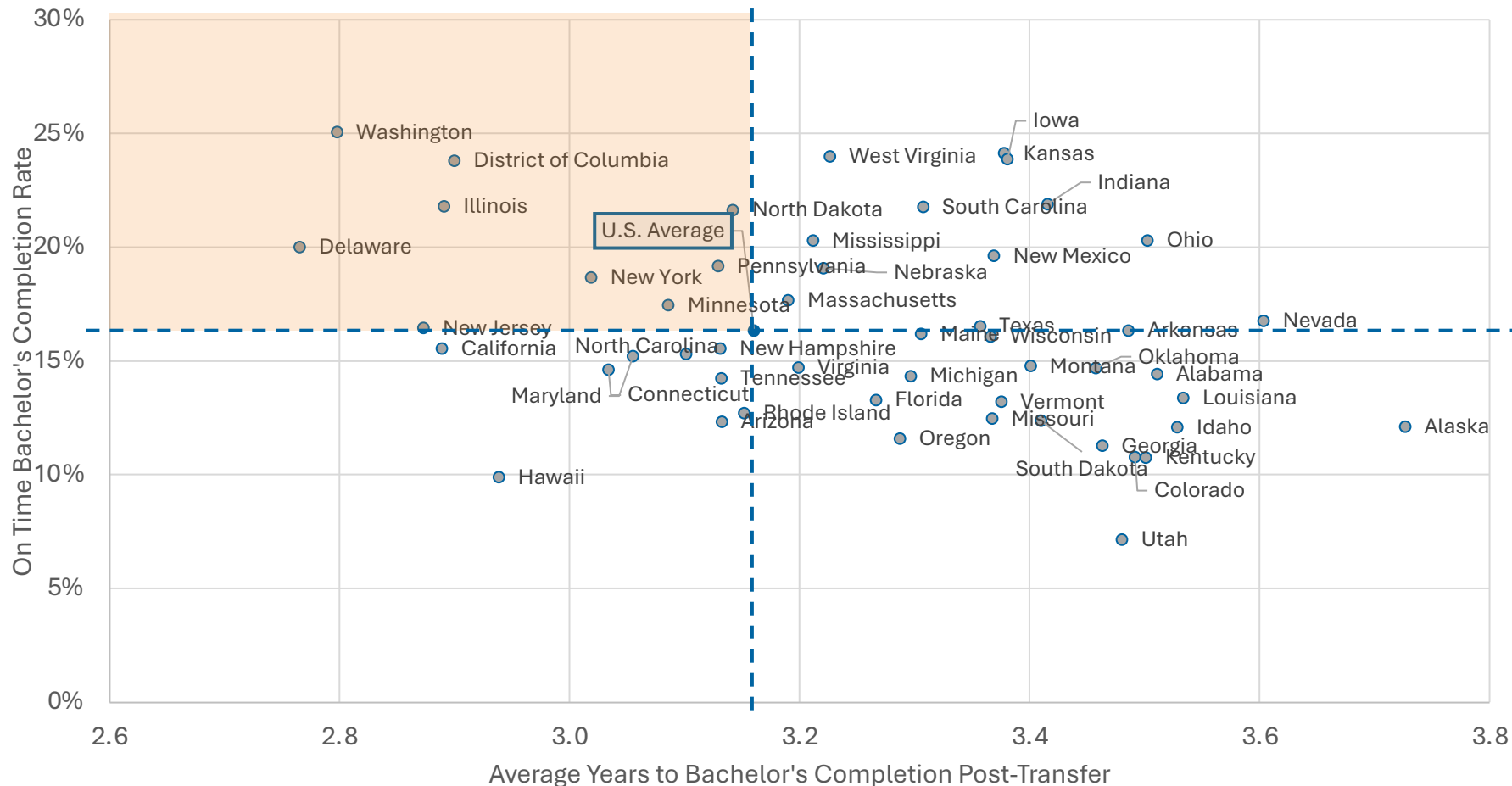
high STEM shares for both groups

States defined by the four-year institution. Wyoming suppressed (fewer than three colleges). Top and bottom 10 states by transfer STEM share.

CCRC

Shorter time after transfer helps, but for many states, improving timely completion also requires focusing on student progress prior to transfer.

Time to Bachelor's Completion Among Community College Transfers STEM Bachelor's Completers, by state



WA and IL

short time after transfer and high on-time rates

CA and NJ

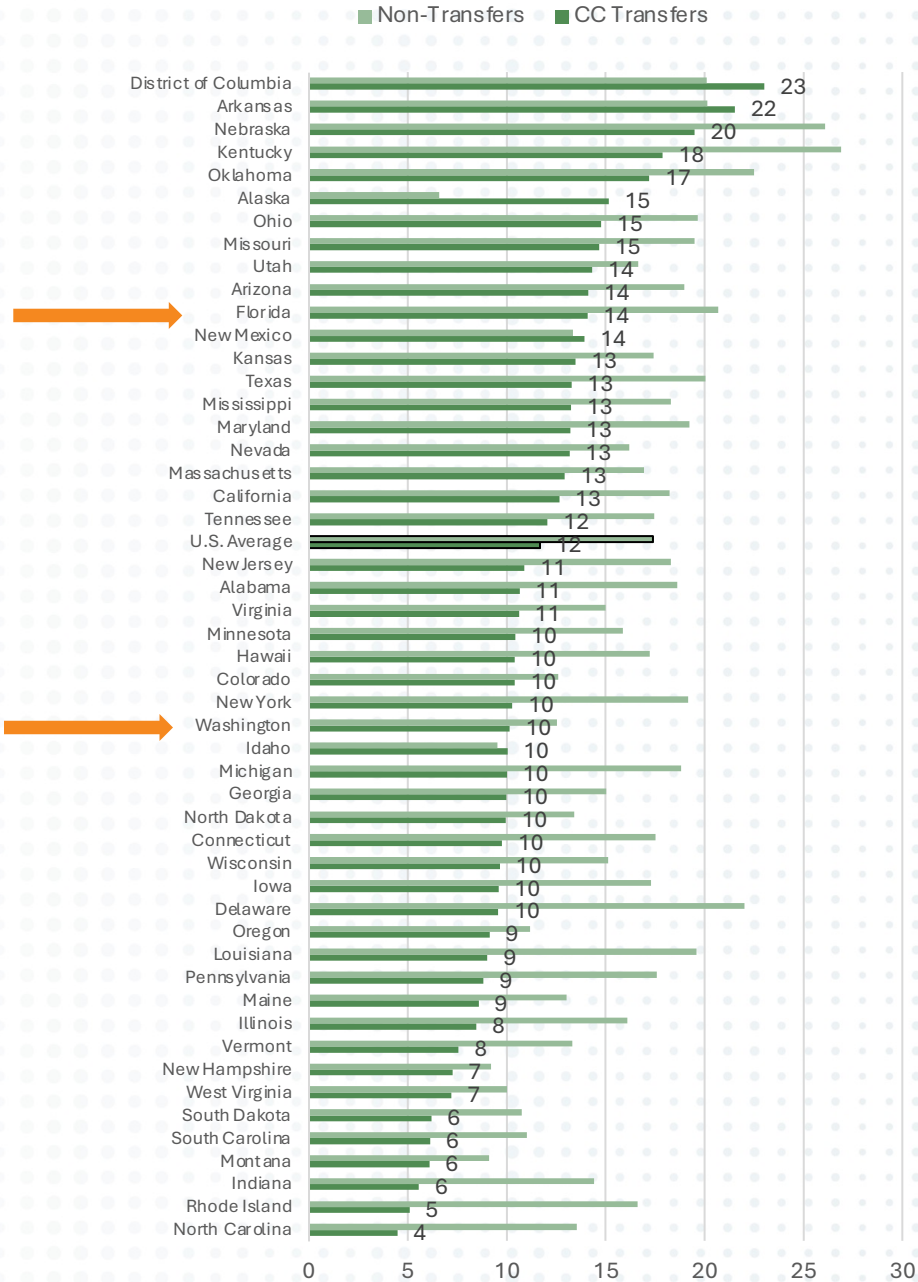
similarly short time after transfer, but average on-time rates

3.2 years

U.S. average after transfer

States with relatively strong STEM transfer bachelor's outcomes do not necessarily have the highest rates of graduate enrollment.

Enrollment Rate in Any Graduate School
Among STEM Bachelor's Completers



A background image showing a group of students walking away from the camera on a paved path. The students are wearing backpacks and casual clothing. In the background, there is a modern building with large glass windows and a balcony. The scene is brightly lit, suggesting a sunny day.

What should universities, community colleges, and states do?

Part 4 | Recommendations

Transfer is a STEM talent strategy, not only an efficiency issue

The goal should be to move beyond improving transfer efficiency to strengthening and diversifying the STEM talent pipeline by broadening access and support for community college students.

Four-year institutions: remove post-transfer barriers

Four-year institutions

Community colleges

States and systems

What we found

+0.4 years

more at the four-year for STEM vs. non-STEM transfer completers

12% vs. 17%

graduate enrollment, transfer vs. non-transfer STEM completers

Addresses Takeaways 2 and 3

1

Align coursework and map STEM sequences

- Map prerequisites and course sequences for CC students
- Ensure access to required upper-division courses
- Place transfers into the right STEM sequence right away
- Track progress by major; departments and transfer offices share responsibility

2

Extend pathways through graduate school

- Equal access to undergraduate research
- Relationships with faculty mentors
- Information on graduate and professional programs
- Guidance on applications and financing

Community colleges: bring more students into STEM

Four-year institutions

Community colleges

States and systems

What we found

17% vs. 23%

of transfer vs. non-transfer completers finish in STEM

10%

of female transfer completers earn a STEM degree; Black (13%) and Hispanic (14%) also trail

Addresses Takeaways 1 and 4

1

Help more students explore STEM

- Explore STEM fields and careers early
- Choose an intended major and transfer destination early
- Build a full plan through bachelor's completion
- Focus on women, Black, Hispanic, and low-income students

2

Major-ready, not just transfer-ready

- Work backward from university STEM requirements
- Complete math, science, and lower-division courses before transfer
- Advising built on major-specific plans
- Connect students with faculty and advisors in the field

States and systems: build the infrastructure

Four-year institutions

Community colleges

States and systems

What we found

10% to 25%

transfer share of STEM completers ranges from 10% or less (19 states) to about 25%

2 vs. 6 pts

Washington's transfer vs. non-transfer STEM gap vs. the national gap

Addresses Takeaway 5

1

Map statewide major-specific STEM pathways

- Bring CCs and universities together to map lower- and upper-division requirements
- Ensure CC coursework counts across receiving institutions
- Guarantees should cover whether credits apply to the major, not just transfer

2

Use data to find and close gaps

- Track from CC entry through transfer, bachelor's, and graduate enrollment
- Disaggregate by field and student group
- Find where students are lost and which pathways work
- Set expectations for colleges and universities

A blurred background image of a classroom. In the foreground, a young woman with dark curly hair tied up, wearing glasses and an orange shirt, is sitting at a desk and writing in a notebook with a pen. In the background, a man in a light-colored sweater and tie is standing and holding a folder, possibly a teacher addressing the class.

Q&A

Which barrier is biggest in your context?
What's one step your institution or state
could take this year?

Thanks!

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