The U.S. Department of Labor defines stackable credentials as a "sequence of credentials that can be accumulated over time to build up an individual’s qualifications and help that individual move along a career pathway to further education and different responsibilities, and potentially higher-paying jobs." A growing number of postsecondary institutions and systems have begun offering or scaling stackable credential programs. These structured education and training pathways—in fields such as health care, information technology, and manufacturing and engineering technology—provide individuals with opportunities to earn certificates, postsecondary credentials that require less time to complete than an associate’s degree, typically between several weeks and a year of coursework and training to complete. These initial certificates provide individuals with immediate job possibilities. Individuals can later build on the foundation of the initial certificates and complete higher-level credentials to advance their careers or pursue additional certificates of the same level or length to diversify their skills.

Research indicates that many individuals earn certificates before reenrolling and stacking credentials. When individuals earn multiple credentials, research shows that they experience increased earnings, on average. Stackable credential programs may be especially helpful for individuals from historically underserved communities. These programs offer greater flexibility to simulta-

KEY FINDINGS

- Low-income certificate-earners were more likely to stack credentials than were middle- and high-income certificate-earners.

- Low-income certificate-earners who stacked credentials were moderately more likely do so by stacking to a higher-level credential (i.e., stacking vertically) than were middle- and high-income certificate-earners.

- Low-income certificate-earners who stacked vertically were more likely to advance to a middle-income wage than were low-income certificate-earners who stacked horizontally or who did not stack at all.

- Stacking rates and labor market returns from stacking varied by field of study. Low-income certificate-earners were prevalent in some high-return fields but not in others.
neously navigate education, employment, family, and other responsibilities. Students seeking an associate’s or bachelor’s degree who find themselves unable to complete that degree in one uninterrupted period of college enrollment can exit with a certificate that offers labor market opportunities, then return later to complete their degree. Still, encouraging individuals from historically underserved communities to stack credentials may be problematic if these individuals do not reenroll after completing their first certificate. Although there is growing interest in stackable credential programs, we know little about whether these programs benefit historically underserved students, such as those from low-income backgrounds.

Using administrative data from Colorado and Ohio, this study examined differences in credential-stacking and labor market returns from stacking for low-income individuals versus middle- and high-income individuals (combined). The following sections describe this study’s approach, its key findings, and the implications of those findings.

How the Study Was Conducted

The researchers used statewide administrative data from the Colorado Community College System (CCCS) and the Ohio Longitudinal Data Archive (OLDA). These data included records of enrollment, credential attainment, and, for Colorado, financial aid applications. Data were matched with National Student Clearinghouse records to obtain information about students’ enrollment and credential attainment in other public and private postsecondary institutions both in and out of state. Data also were matched with state unemployment insurance (UI) databases to obtain quarterly employment and earnings information in UI-covered sectors.

The sample consisted of individuals who earned their first-ever-observed certificate from one of Colorado’s 13 CCCS colleges or one of Ohio’s 23 community colleges between 2006 and 2015. The sample was limited to certificate-earners age 20 to 64 who were residents of Colorado or Ohio and had no history of dual enrollment in high school and college. However, individuals who earned an associate’s degree or higher-level credential prior to earning their first certificate were included in the sample. The final sample consisted of 35,663 certificate-earners in Colorado and 45,584 certificate-earners in Ohio.

Using UI data on precollege earnings, the researchers categorized certificate-earners as low-income, middle- and high-income (combined), or unknown. Researchers also had financial aid application data for Colorado certificate-earners and used this as a second step in coding students who otherwise would have been categorized as unknown based on precollege earnings. See Box 1 for a definition of these income groups and the full report for additional details. A majority of certificate-earners in both states were categorized as low-income (63 percent in Colorado and 52 percent in Ohio). Income status could not be determined for about one-sixth (15 percent) of Colorado certificate-earners and almost one-quarter (23 percent) of Ohio certificate-earners; these students were omitted from the analysis.

Box 2 provides the definitions of stacking used in this study. Researchers measured stacking within three years of the date an individual completed a first certificate unless otherwise indicated.

In interpreting these results, readers should keep in mind that the sample was limited to individu-

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**Box 1**

**How Was Low-Income Defined?**

This study examined individuals in two income groups: (1) low-income individuals and (2) middle- and high-income individuals (combined).

**Low-income individuals** were defined as having precollege earnings at or below 200 percent of the Federal Poverty Level (FPL). For reference, an individual living alone in 2019 and earning 200 percent of the FPL would earn roughly $25,000 annually. Precollege earnings were measured three years prior to earning the first certificate and included quarters in which an individual had no earnings records, which were treated as zero earnings. Quarterly earnings records prior to age 18 were excluded.

In addition to earnings, financial aid application information was available for Colorado certificate-earners. If a Colorado certificate-earner had no earnings data but had financial aid application data, the researchers used the Expected Family Contribution (EFC) to determine income status. Certificate-earners with an EFC at or below the cutoff for a Pell Grant were categorized as low-income. For the 2018–2019 academic year, this cutoff was approximately $5,500.
als who earned a first certificate. Certificate-earners already have had some success in college and might be in a stronger position to complete additional credentials than individuals who were unable to obtain an initial credential. As noted, some individuals in the sample had college degrees that preceded their first certificate.

Key Findings

Low-income certificate-earners were more likely to stack credentials than were middle- and high-income certificate-earners. As shown in Table 1, across several time frames for stacking credentials, low-income certificate-earners completed stacked credentials at higher rates than middle- and high-income certificate-earners. For example, in Colorado, 39 percent of low-income individuals who earned their first certificate in the CCCS stacked credentials within three years, compared with 33 percent of middle- and high-income certificate-earners. The trend was similar in Ohio, where 43 percent of low-income certificate-earners and 36 percent of middle- and high-income certificate-earners stacked credentials within three years.

Low-income certificate-earners who stacked credentials were moderately more likely to do so by stacking to a higher-level credential (i.e., stacking vertically) than were middle- and high-income certificate-earners. In Colorado, 58 percent of low-income certificate-earners who stacked within three years did so by obtaining a higher-level credential, while a slightly smaller 55 percent of middle- and high-income certificate-earners who stacked credentials did so vertically (Figure 1). In Ohio, 65 percent

TABLE 1
Stacking Rates, by State and Student Income Status

<table>
<thead>
<tr>
<th>Percentage of credentials stacked</th>
<th>Colorado</th>
<th></th>
<th></th>
<th></th>
<th>Ohio</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low-Income</td>
<td>Middle- and High-Income</td>
<td>Difference</td>
<td></td>
<td>Low-Income</td>
<td>Middle- and High-Income</td>
<td>Difference</td>
<td></td>
</tr>
<tr>
<td>Simultaneously</td>
<td>13.0%</td>
<td>11.5%</td>
<td>1.5%</td>
<td></td>
<td>14.8%</td>
<td>11.9%</td>
<td>2.9%</td>
<td></td>
</tr>
<tr>
<td>Within one year</td>
<td>25.3%</td>
<td>21.9%</td>
<td>3.4%</td>
<td></td>
<td>30.4%</td>
<td>25.7%</td>
<td>4.7%</td>
<td></td>
</tr>
<tr>
<td>Within two years</td>
<td>32.9%</td>
<td>27.9%</td>
<td>5.0%</td>
<td></td>
<td>37.7%</td>
<td>31.9%</td>
<td>5.8%</td>
<td></td>
</tr>
<tr>
<td>Within three years</td>
<td>38.6%</td>
<td>32.8%</td>
<td>5.8%</td>
<td></td>
<td>42.6%</td>
<td>36.0%</td>
<td>6.5%</td>
<td></td>
</tr>
<tr>
<td>Within four years</td>
<td>42.1%</td>
<td>36.1%</td>
<td>6.0%</td>
<td></td>
<td>45.8%</td>
<td>38.8%</td>
<td>7.0%</td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: Authors’ calculations using data from CCCS and OLDA.

NOTE: The sample consisted of individuals who earned their first-ever-observed certificate from a CCCS college or Ohio community college between July 1, 2006, and June 30, 2015. Certificate-earners may have earned an associate’s degree or higher-level credential prior to their first certificate. Stacking was defined as earning an additional undergraduate credential of any level, in any field of study, and at any institution. Simultaneous stacking was defined as earning a first-ever-observed certificate and an additional credential on the same date. Certificate-earners whose income status was unknown were omitted from the table.
Certificate-earners were prevalent in some high-return fields but not in others. Table 2 summarizes income, stacking, and labor market characteristics of the ten fields with the most certificate-earners in Colorado and Ohio. Findings suggest complex relationships between concentrations of low-income certificate-earners, opportunities for stacking, and labor market returns across fields of study. Mechanics and nursing had high concentrations of low-income certificate-earners and high rates of total stacking (mechanics) or vertical stacking (nursing), and these fields offered opportunities to earn middle-income wages. Other fields—notably, education and family and consumer services—likewise had high concentrations of low-income certificate-earners and offered opportunities for stacking, yet they provided limited labor market returns. Information technology and manufacturing and engineering technology had high stacking rates and strong labor market returns from stacking, but both had low concentrations of low-income certificate-earners.

Implications

These findings have several important implications for the educational and economic opportunities of individuals from low-income backgrounds.

Stacking credentials can provide a promising path to a middle-income wage for low-income certificate-earners, but the type of stacked credential and field of study matter. Low-income certificate-earners stacked credentials at higher rates than middle- and high-income certificate-earners. However, only vertical stackers experienced strong labor market returns from stacking. Returns also differed by field of study. Low-income certificate-earners were concentrated in some fields with lower returns and some fields with higher returns.

It is critically important to ensure that low-income individuals and other historically underserved individuals are aware of and can access credentials leading to meaningful employment opportunities. The findings show that low-income certificate-earners may be more likely to stack credentials in some fields with limited labor market opportunities, such as education and family and consumer services, and less likely to pursue other credentials in fields with high labor market returns, especially information technology and manufacturing and engineering technology. Policymakers, college administrators,
and practitioners should evaluate whether low-income individuals have access to the information needed to identify credentials with strong labor market returns and consider policies and practices that encourage low-income students to pursue these credentials.

Policymakers and practitioners should scale stackable credential programs that lead to meaningful earnings gains. Labor market returns from credential-stacking varied by field of study. Fields such as nursing, information technology, and manufacturing and engineering technology provided high...
This brief describes work done in RAND Education and Labor and the Center for the Study of Higher and Postsecondary Education at the University of Michigan–Ann Arbor and documented in Stackable Credential Pipelines and Equity for Low-Income Individuals: Evidence from Colorado and Ohio, by Lindsay Daugherty, Peter Riley Bahr, Peter Nguyen, Jennifer May-Trifiletti, Rooney Columbus, and Jonah Kushner, RR-A2484-1, 2023 (available at www.rand.org/t/RRA2484-1). To view this brief online, visit www.rand.org/t/RBA2484-2. The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest. RAND’s publications do not necessarily reflect the opinions of its research clients and sponsors. RAND® is a registered trademark.

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TABLE 2
Stacking Rates and Labor Market Outcomes in Each State, by Field of Study

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>Field Has a High Concentration of Low-Income Certificate-Earners</th>
<th>Field Has a High Stacking Rate</th>
<th>Field Has a High Percentage of Stackers Who Stacked Vertically</th>
<th>Field Has a High Percentage of Stackers Who Go on to Earn a Middle-Income Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allied health</td>
<td>Ohio</td>
<td>Both states</td>
<td>Colorado</td>
<td></td>
</tr>
<tr>
<td>Business</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culinary and personal services</td>
<td>Colorado</td>
<td>Ohio</td>
<td>Colorado</td>
<td></td>
</tr>
<tr>
<td>Design and applied arts</td>
<td>Both states</td>
<td>Both states</td>
<td>Colorado</td>
<td></td>
</tr>
<tr>
<td>Education and family and consumer sciences</td>
<td>Both states</td>
<td>Both states</td>
<td>Ohio</td>
<td></td>
</tr>
<tr>
<td>Information technology</td>
<td>Both states</td>
<td></td>
<td></td>
<td>Both states</td>
</tr>
<tr>
<td>Manufacturing and engineering technology</td>
<td>Both states</td>
<td>Colorado</td>
<td></td>
<td>Both states</td>
</tr>
<tr>
<td>Mechanics</td>
<td>Both states</td>
<td></td>
<td></td>
<td>Both states</td>
</tr>
<tr>
<td>Nursing</td>
<td>Both states</td>
<td>Both states</td>
<td>Ohio</td>
<td></td>
</tr>
<tr>
<td>Security and protective services</td>
<td>Both states</td>
<td></td>
<td></td>
<td>Both states</td>
</tr>
</tbody>
</table>

SOURCE: Authors’ analysis using data from CCCS and the OLDA.

NOTE: A field of study was rated as high on a particular characteristic if it exceeded the median value of all fields of study (within a state). Low-income certificate-earners had precollege earnings at or below 200 percent of the FPL or an EFC at or below the threshold for Pell Grant eligibility. Stacking was defined as earning an additional credential of any level, in any field of study, and at any institution within the specified time frame relative to an individual’s first certificate. Vertical stackers earned an additional higher-level credential within three years. Middle-income wage was defined as annualized quarterly earnings > 200 percent of the FPL, 24 quarters after earning a first certificate, conditional on having earned a stacked credential.

returns to certificate-earners who stacked credentials. Policymakers and college administrators should consider ways in which they can expand stackable credential programs in these fields.

Stackable credentials are an increasingly common approach to providing educational and labor market advancement opportunities for low-income individuals and historically underserved individuals. These findings provide evidence that some types of stacking can benefit low-income students. Clearly, though, not all stacking is equally valuable, and policymakers and college administrators should take care to emphasize and grow credential-stacking in fields leading to strong labor market returns and help low-income individuals identify these opportunities.

Note

1 The Ohio Longitudinal Data Archive is a project of the Ohio Education Research Center (http://www.oerc.osu.edu/) and provides researchers with centralized access to administrative data. The OLDA is managed by The Ohio State University’s CHRR (https://chrr.osu.edu/) in collaboration with Ohio’s state workforce and education agencies (http://ohioanalytics.gov/), with those agencies providing oversight and funding. For information on OLDA sponsors, see http://chrr.osu.edu/projects/ohio-longitudinal-data-archive.