

Improving the Recruitment and Retention of Construction Apprentices through Oregon's Highway Construction Workforce Development Program

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Abstract

Oregon's Highway Construction Workforce Development Program aims to improve the recruitment and retention of a diverse construction workforce, through pre-apprenticeships that provide alternative pathways into apprenticeship as well as financial and non-financial retention services that aim to help apprentices complete their apprenticeships. This evaluation research examines the impact of the Program on recruitment and retention trends, drawing on administrative data from the Program as well as interviews with program participants. We find pre-apprenticeship programs have improved the recruitment of women into the trades. We further find that non-financial services, ready supplies, and childcare services have a positive impact on completion, with receipt of non-financial support having the largest impact on completion. Gas/travel services are positively associated with completion among apprentices of color. Interview data suggest that additional support services for apprentices as well as structural changes to the industry are needed to achieve construction workforce diversity goals.

Keywords

construction trades, apprentice, recruitment, retention

Introduction

The construction trades have historically been, and continue to be, dominated by white men. According to the Bureau of Labor Statistics, in 2020, men comprised 96 percent of workers in construction and extraction occupations, and white people made up about 88 percent of these workers.¹ Research has demonstrated that women and people of color do not have the same access to entering construction trades apprenticeships as men and white people; additionally, when women and people of color do enter the trades, they are likely to encounter racist and sexist

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harassment and discrimination at work, leading many to leave the trades (Denissen and Saguy 2014; Hunte 2016; Ibanez 2017; Kelly et al 2015; Kelly and Wilkinson 2020; MacIsaac and Domene 2014; Ness 2012; Wright 2013). Despite these challenges, jobs in construction are potentially desirable for many workers, given the minimum educational entry requirements, ability to earn money while training as an apprentice (and avoid student loan debt), opportunities for advancement, and a living wage and benefits for those able to remain consistently employed (Haines et al 2020; Moir, Thomson, and Kelleher 2011). Advocates for diversity in the construction workforce argue that these opportunities should not be denied (by design or by circumstance) to women workers and workers of color, especially when public dollars are used (Haines et al 2020). In response, public agencies and other stakeholder organizations have implemented a variety of policies and programs intended to improve the recruitment and retention of a diverse construction workforce. These efforts aim to address long-standing practices of exclusion, to ensure that public dollars spent on capital projects do not continue to disproportionately benefit members of dominant groups, to provide community benefits in the form of creating high-wage careers in the trades, and to maintain a strong pipeline of new workers, given projections of future labor shortages in the construction trades (Associated General Contractors [AGC] 2021; Johansson and Woods 2016; Moir et al. 2011).

A focus on expanding recruitment has become even more important in the context of current labor shortages. Associated General Contractors (AGC) surveyed 1,329 construction firms in the United States in late 2020. They found,

Fifty-four percent of firms report difficulty finding qualified workers to hire, either to expand headcount or replace departing staff. Many contractors expect, despite the pandemic-induced downturn, that it will remain difficult to find qualified workers during the coming 12 months. Forty-nine percent report it will either get harder, or will remain as hard, to find qualified workers, in 2021. (AGC 2021:6)

The Oregon Employment Department has also reported on employers' difficulty in finding entry-level workers across industries, and especially in construction, which represents the third fastest growing industry in Oregon (Bechtoldt 2020; Lehner 2021).

Given the challenges with recruitment, it will be critical to expand efforts at retaining apprentices. Among individuals who started apprenticeships in Oregon between 2005 and 2013, only 41 percent of white men completed their apprenticeships, with lower retention rates for some other race/gender groups (Kelly and Wilkinson 2020). As noted in this research, the reasons apprentices leave include a lack of consistent work and other financial challenge as well as challenges on the job, such as harassment, discrimination, and a lack of access to mentorship on the job (Kelly and Wilkinson 2020). Even if we move past the current challenge of labor shortages, retention remains important as the lost investment in canceled apprentices is considerable. Ultimately, a relatively small investment in retention from public agencies, contractors, and/or apprenticeship Programs may result in substantial overall savings for the industry.

As a result of new policies and programs in Oregon, trends in the recruitment and retention of a diverse construction workforce are changing: Among apprentices who completed a highway construction apprenticeship in 2010–2011, 76 percent were white men while in 2018–2019, this number was 66 percent; conversely, then, the proportion of apprentices completing highway construction apprenticeship who are self-identified as women and/or people of color went from 24 percent in 2010–2011 to 34 percent in 2018–2019 (Kelly and Wilkinson 2020). Central to these efforts have been the collaborative efforts by the Oregon Department of Transportation (ODOT) and the Oregon Bureau of Labor & Industries to diversify the skilled highway construction workforce through the Highway Construction Workforce Development Program (referred to as “the Program” going forward). The current analysis examines the impact the Program has had

on recruiting and retaining a diverse highway construction trades workforce. We use Bureau of Labor & Industries' Oregon Apprenticeship System (OAS) data from 2008 to 2019 and interviews conducted in 2020 with recently completed or canceled highway trades apprentices in Oregon who received services from the Program.

Diversity in the Construction Trades Workforce

Recent research has documented the variety of issues that women and people of color continue to face in the construction workforce. For example, there is often a perception among job seekers and job advisors (e.g., guidance and employment counselors, family and friends in the trades) that construction work remains a job for white men; furthermore, many women and people of color lack personal relationships with current construction workers or lack exposure to construction-related skills, inhibiting some women and people of color from entering construction trades (Jenkins et al. 2019; MacIsaac and Domene 2014; Simon and Clarke 2016). Once on the job, many tradespeople experience a hostile work environment characterized by racist, sexist, and heterosexist jokes and comments (Denissen and Saguy 2014; Hunte 2016; Ibanez 2017; Kelly et al 2015; Kelly and Wilkinson 2020; MacIsaac and Domene 2014; Ness 2012; Wright 2013). This lack of acceptance on the job site can result in discrimination based on race/ethnicity, gender, and sexual identity; specifically, trades workers can experience an inability to access the personal relationships and networks that are necessary for mentoring relationships in which they learn the skills of the trade as well as an inability to access continuous employment, both of which are critical for success in the trades (Berik, Bilginsoy, and Williams 2011; Duke et al. 2013; Galea et al. 2015; Ibanez 2017; Jenkins et al. 2019; MacIsaac and Domene 2014; Simon and Clarke 2016; Taylor, Hamm, and Raykov 2015; Wright 2016). There are also unique challenges for work/family conflict in the trades, such as irregular and changing schedules and traveling long distances for work; scholars have noted that a lack of accommodations to address these issues disproportionately impacts women in the trades (Galea et al. 2015; Ibanez 2017; MacIsaac and Domene 2014; Simon and Clarke 2016; Taylor et al. 2015). These issues with both recruitment and retention of women and people of color in the trades have resulted in the lower percentage of women and people of color in construction, compared with their representation in the broader workforce.

Some scholars have noted that some programs designed to improve the recruitment and retention of women have failed, especially when they do not create fundamental shifts within organizations (Galea et al. 2015; Ness 2012). Ness (2012) suggested that change is more likely to fail when organizations frame policy changes (e.g., work/life balance initiatives) as a "women's issue," increase recruitment without addressing issues of retention (e.g., harassment), implement policies without aligning them with company values, initiate changes that have low priority within the organization, and fail to enforce policies once they are in place. Others have described programs that have been successfully implemented, including those aiming to increase diversity among workers utilizing workforce diversity goals in construction project contracts as well as those providing support for recruitment and retention, such as pre-apprenticeships and ongoing mentoring, in states such as Oregon, Maryland, Illinois, and Minnesota as well as in cities such as Boston, New Haven, New York, Portland, San Francisco, and Los Angeles (Hegewisch et al. 2014; Hegewisch and O'Farrell 2014, 2015; Johansson and Woods 2016; Moir et al. 2011). The Program addressed in this evaluation research project is described in the following section.

Highway Construction Workforce Development Program

The goal of the Highway Construction Workforce Development Program² is to improve stability and diversity of the highway construction workforce by promoting recruitment and retention of apprentices. The Program was initially established by a 2009 Bill from the Oregon Legislature that directed the transportation department to use a portion of its federal highway funds for the

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If you are an applicant or an apprentice in one of these programs, you should call Penny: carpenters (including pile drivers, scaffold erectors, etc.), cement masons, ironworkers, laborers, operating engineers, or painters.
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Image 1. Flyer for the Program.

Source: <https://www.oregon.gov/odot/Business/OCR/Pages/Workforce-Development.aspx>.

Program, and supportive services were first provided to apprentices through the Program in 2011. The first Program participants were those who were active during 2011, some of whom started their apprenticeship as early as 2008. At the time of this evaluation, the funding for the Program was \$2.1 million per biennium.³ The Program served 1,564 apprentices between 2011 and 2019. Program funding is available to apprentices currently working on highway or bridge projects as well as apprentices in “eligible” trades, or selected trades with workers most likely to be working on highway or bridge projects: carpenters (and allied trades), cement masons, ironworkers, laborers, operating engineers (and allied trades), and painters. This is because the Program funding comes from federal Department of Transportation and is administered based on guidance provided to ODOT by the Federal Highway Administration (FHA).

The elements of the program included in this evaluation are pre-apprenticeship programs and financial and non-financial supportive services (see Image 1). In addition, the Program has funded additional efforts, including respectful workplace training on job sites, a respectful workplace curriculum for supervisors (and a train-the-trainer session for those providing technical assistance to employers on this topic), online training on nutrition, and career fairs and summer camps for youth (middle school and high school).

Pre-apprenticeship Programs

The Program has funded pre-apprenticeships to provide most of the services that have been directed toward building a more diverse pipeline of applicants for apprenticeships in the highway construction trades. These pre-apprenticeships are designed to help individuals to successfully enter an apprenticeship program and to arrive on their first job sites prepared to start learning their trade. Most pre-apprenticeships are organized around helping a particular population that has been underrepresented in the trades and provide general instructions in topics that are

common to several construction trades. In addition to pre-apprenticeships designed to reach women, people of color, formerly incarcerated individuals, and disadvantaged youth, there are pre-apprenticeships organized around career and technical education, as it can be beneficial to anyone who does not have family or friends in the trades to orient them and act as a common conduit for employment in this sector. Pre-apprenticeship programs also offer ongoing mentoring and support for their graduates, through apprenticeship and beyond. At the time of this evaluation, the pre-apprenticeship programs currently receiving funding through the Program were Oregon Tradeswomen, Inc.,⁴ Constructing Hope,⁵ Portland Youthbuilders,⁶ and several trade-specific pre-apprenticeship classes provided through the carpenter and cement mason unions (often provided to individuals who have already completed another pre-apprenticeship program and want to get more specific hands-on skills related to a particular trade to help them to be better prepared when they start an apprenticeship).

Supportive Services for Apprentices

Supportive services provide financial and non-financial assistance to apprentices to allow them to accept (and complete) more jobs and improve overall retention in apprenticeship programs. Supportive services are available to current apprentices in registered apprenticeships working in eligible trades (carpenters, cement masons, ironworkers, laborers, operating engineers, and painters) as well as apprentices in any trade who are working on a highway and/or bridge job. At the time of this evaluation, the Program funded the following supportive services:

- Job readiness supplies, such as work tools, work clothing, and personal protective equipment (PPE) for first-year apprentices (\$500 maximum per apprentice);
- Fuel assistance for travel to and from job sites and required classes more than 60 miles from home (\$1,000 maximum);
- Assistance with lodging (\$1,500 maximum) and meals (\$250 maximum) for jobs more than 60 miles from home;
- Childcare subsidies (maximum of \$10,000 per apprentice with increases made according to the assessment of household income, household size, and ages of children);
- Hardship funds for one-time financial challenges (maximum of \$1,000);
- Non-financial support services, including a budget class, mentoring, and referrals to other services.

The goal of the Program's supportive services is to improve retention and increase completion rates of apprentices, while also serving the larger goal of creating a more diverse journey-level workforce. As ODOT, like many public owners, has utilization requirements for apprentices (to encourage the industry to train its future workforce) and diversity goals for both construction apprentices and journey workers, this ultimately helps businesses to meet contractual goals and helps ODOT to meet a performance measure as a steward of public funds.

In this article, we draw on quantitative administrative data to answer the questions: How has the Program impacted the recruitment and retention of apprentices in the highway construction trades in Oregon? Which retention services have the largest impact? We draw on interviews with recently canceled or completed apprentices who received services through the Program to assess the questions: How do participants describe how the Program has supported them? What gaps in support remain? In our analysis, we alternate between the quantitative and qualitative data, first illustrating the larger trends and then delving into the narratives of individuals to help us better understand the dynamics of these trends.

Methods

Research Design

This is a mixed-methods analysis drawing on quantitative administrative data provided by the Program and qualitative interviews conducted by our research team. This represents an additional mixed-methods design, in which researchers answer different (but related) research questions with each method (Morgan 2013).

Quantitative Data Analysis

We use data from the Oregon Apprenticeship System (OAS) database of current and past apprentices in Oregon and administrative data tracking Program participation for the quantitative portion of this study. To assess recruitment, including the effectiveness of pre-apprenticeships in recruitment, we analyze data from apprentices who began an apprenticeship between 2008 and 2019 and did not cancel with zero credit hours accumulated ($N = 7,700$). In analyses examining retention, we include apprentices who began an apprenticeship between 2008 and 2019, did not cancel with zero credit hours accumulated, were eligible for supportive services through the Program, and either completed or canceled their apprenticeship ($N = 5,457$). Apprentices in the following trades were considered eligible for supportive services: carpenter, cement mason, ironworker, laborer, operating engineer, and painter. In cases where apprentices had multiple agreements, the average or sum of their characteristics was taken. For example, when determining completion of an apprenticeship, the sum of all agreements completed was used to create a dichotomous variable indicating whether the apprentice completed one or more agreements. Thus, the unit of analysis is the apprentice, not the apprenticeship agreement. The characteristics of the full OAS population ($N = 7,700$) are shown in Table 1.⁷

To address how pre-apprenticeship has impacted recruitment of women and people of color into the trades, we examine the percentage of new apprentices completing a pre-apprenticeship across race/gender groups, between 2008 and 2019. To address how pre-apprenticeship has contributed to retention, we examine the unadjusted and adjusted estimated effects of pre-apprenticeship on completion of an apprenticeship using bivariate and multivariable regression models. To address how Program supportive services have impacted retention in highway trades apprenticeships, we examine the unadjusted and adjusted estimated effects of receiving any Program supportive service on completion. We assess the independent effects of each supportive service type to determine what services have the largest impact on retention, adjusting for the following variables in multivariable regression models: race/ethnicity, gender, age, trade, union status, prior credits, region, cohort, and receipt of other Program services, including a pre-apprenticeship. All control variables were constructed using OAS data. We run separate models by race/gender groups and assess statistical significance in differences in effect sizes by race/gender using interactions in regression models. We estimate marginal effects using post-estimation commands in Stata 15.0.

Qualitative Data Collection and Analysis

The population for the interviews included all Oregon apprentices working in eligible trades who had received services from the program and either completed or canceled their apprenticeship in 2018 and 2019 (a total of 175 individuals). Names and contact information for these potential participants were provided by the Oregon Bureau of Labor & Industries. A non-random stratified sample was used to ensure representation from both completed and canceled apprentices, men and women apprentices, and white apprentices and apprentices of color. The final sample of apprentices interviewed for this analysis is 26.⁸

Table 1. Descriptive Statistics of OAS.

Variable	Percent	N
Status in 2019		
Completed	27.06	2,084
Canceled	43.81	3,373
Active	27.83	2,143
Other	1.30	100
Cohort		
2008	6.49	500
2009	2.84	214
2010	3.55	259
2011	5.25	384
2012	4.71	335
2013	9.45	678
2014	8.82	624
2015	8.74	617
2016	13.22	942
2017	14.19	998
2018	16.57	1,165
2019	14.45	984
Race/Gender		
White women	7.27	560
Black/African American women	0.99	76
Hispanic/Latina women	1.31	101
Asian women	0.34	26
Native American women	0.78	60
White men	58.09	4,473
Black/African American men	6.77	521
Hispanic/Latino men	18.27	1,406
Asian men	1.87	142
Native American men	4.38	335
Pre-apprenticeship	3.61	278
Any apprenticeship service	20.31	1,564
Apprenticeship service		
Ready supplies (tools, clothing, PPE)	16.84	1,297
Travel (gas, hotel, food)	6.01	463
Childcare	2.12	163
Non-financial support	2.77	213
Trade		
Union carpenter	56.19	4,327
Nonunion carpenter	5.84	450
Union laborer	9.96	767
Nonunion laborer	6.05	466
Other union highway trade	18.45	1,421
Other nonunion highway trade	3.49	269
Portland metro area	49.13	3,783
	<i>M</i>	<i>N</i>
Age	28.87	7,700
Prior credits	492.44	7,700
Total		7,700

Note. OAS = Oregon Apprenticeship System; PPE = personal protective equipment.

Table 2. Interview Demographics.

Demographic	N
Completed/canceled in 2018–2019	
Completed	16
Canceled	10
Race	
White	14
Black/African American	4
Hispanic/Latino	6
Multiracial	2
Gender	
Men	16
Women	10
Sexual identity	
Straight	21
Gay, lesbian, bisexual, or something else	5
Refused	1
Family type	
Single with no children	2
Partnered with no children	8
Single with children (part-time custody)	3
Single with children (full-time custody)	2
Partnered with children (full-time custody)	11
Age	
Average age	34
Pre-apprentice services	
Oregon Tradeswomen	4
Constructing Hope	2
Carpenter Trade Preparation	1
Apprenticeship services	
Ready supplies (tools, clothing, PPE)	24
Travel (gas, hotel, food)	6
Childcare	6
Hardship funds	5
Non-financial support (as reported in Program data)	4
Non-financial support (as reported by participants)	20
Trade	
Carpenter	12
Exterior/interior carpenter	8
Laborer	4
Cement mason	1
Painter	1
Total	26

Note. PPE = personal protective equipment.

The interview guide focused on (1) financial and non-financial challenges experienced by apprentices, (2) financial and non-financial support from the Program, and (3) financial and non-financial support received from other sources. In this article, we focus on the financial and non-financial support from the Program. All interviews were conducted via telephone by a member

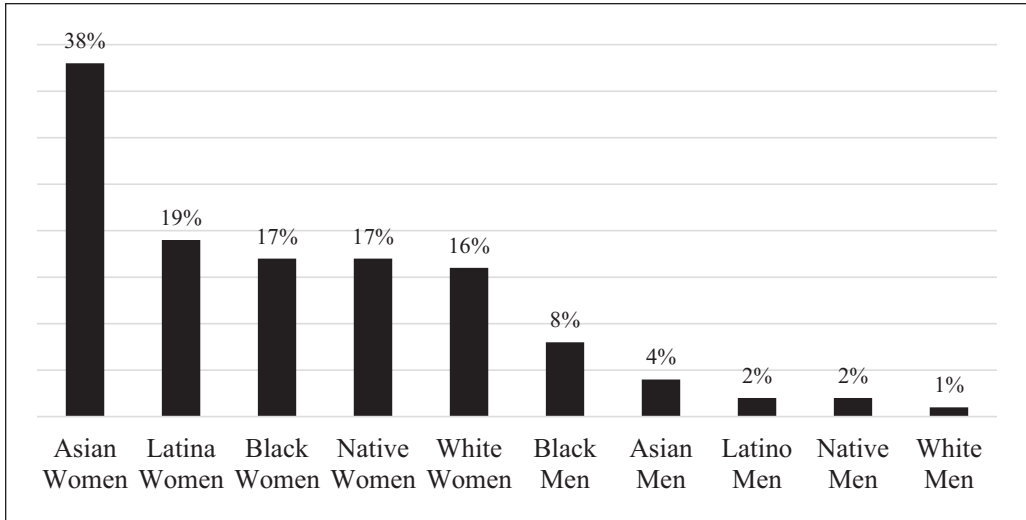


Figure 1. Percentage of highway trades apprentices completing a pre-apprenticeship by race/ethnicity and gender, 2008–2019 cohorts.

of the research team in April and May of 2020.⁹ Interviews were an average of 28 minutes and ranged from 16 to 48 minutes. Interviews were audiotaped and transcribed. The demographics of the interview sample are shown in Table 2.

The interview data were analyzed using the qualitative coding software Dedoose. The goal of the qualitative analysis was to determine how the program had helped apprentices overcome challenges, which elements of the program were most helpful, and what additional supports are needed to further improve the recruitment and retention of a diverse workforce in the construction trades.

Findings

Addressing Recruitment through Pre-apprenticeship

A primary goal of the Program is to improve the recruitment of a diverse workforce. Pre-apprenticeship provides a pathway into the trades for those who do not have access to the traditional pathway into the trades—that is, having family or friends in the trades. Over the lifetime of the Program (2008–2019), pre-apprenticeship programs funded through the Program have meaningfully contributed to diversifying the construction trades. Most notable is the impact on the representation of women in the highway construction trades; at least 16 percent of women from all racial/ethnic groups who entered into an apprenticeship did so via a pre-apprenticeship program (see Figure 1). Among men, Black men are the most likely to enter into an apprenticeship via pre-apprenticeship (8 percent; see Figure 1).

A total of 278 individuals entered into a highway apprenticeship via a pre-apprenticeship program between 2008 and 2019 (see Figure 2). The scale of pre-apprenticeship to apprenticeship in Oregon is fairly small: To put this in perspective, there were a total of 7,700 new apprentices in the highway construction trades during the 2008–2019 period (278 of whom entered via a pre-apprenticeship). Furthermore, pre-apprenticeship programs place many of their graduates in other positions in construction and related industries, not only in registered apprenticeships, and those successful placements are not reflected in these figures.

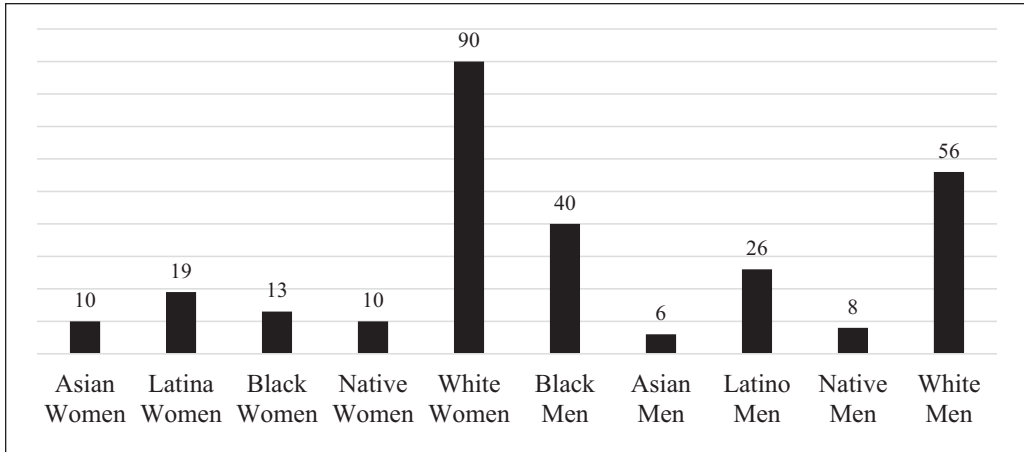


Figure 2. Number of highway trades apprentices completing a pre-apprenticeship by race/ethnicity and gender, 2008–2019 cohorts.

At the bivariate level, completing a pre-apprenticeship is positively associated with completing an apprenticeship among women but not among men; specifically, women who complete a pre-apprenticeship are 26 percent more likely to complete their apprenticeship program, compared with women who did not complete a pre-apprenticeship, and this difference is statistically significant ($p < .001$).¹⁰ The positive effect of completing a pre-apprenticeship among women remains after accounting for factors associated with having a pre-apprenticeship and completing an apprenticeship, including race/ethnicity, age, trade and union status, prior credit, region, cohort, and receipt of Program supportive services (see Table 3). Results from multivariable models indicate that, among all women, the adjusted marginal effect of completing a pre-apprenticeship on completion is 0.14. We find that pre-apprenticeship does not increase the likelihood of completion among men, which is likely due to the characteristics of the men who participate in pre-apprenticeships: They are generally disadvantaged workers who have a variety of ongoing challenges prior to and during apprenticeship, such as the lingering impacts of having a criminal record and experiencing poverty (Kelly et al 2019). We are unable to fully account for these factors in multivariable models using administrative data.

Among interview participants, four completed the Oregon Tradeswomen pre-apprenticeship, two completed the Constructing Hope pre-apprenticeship, and one completed the Carpenter Trade Preparation pre-apprenticeship. In addition, one reported participating in the Bridge Bootcamp between a pre-apprenticeship and an apprenticeship. One interview participant described how Constructing Hope provided both non-financial and some financial support:

On top of essentially giving me the knowledge, skills, with each and every different trade that they presented to me, they also provided me the steel toe boots that I didn't have and a hard hat. On top of that, too, they had a different list of jobs and whatever whatnot that I could take or essentially they give you contacts for different jobs for starting out. That reminds me, I need to give them a call and update what I'm up to . . . [It would be] probably a big problem [if I hadn't received that support] because of Constructing Hope and the Bridgework Bootcamp I would not have known where to start with tools and with PPE and what to wear and whatever whatnot, nor would I expect what kind of, how do you say, culture I'd be getting into with the construction world. Both [the Program] and Constructing Hope has helped me. (Brian, multiracial man, completed)

Oregon Tradeswomen pre-apprenticeship graduates described how the program helped them be successful during their pre-apprenticeship and through their apprenticeship:

Table 3. Coefficients from Multivariable Logistic Regression Models Predicting Completion, Preapprenticeship.

Variable	Coefficient	p value
Pre-apprenticeship	-0.37	.096
Women	-0.50	.000
Pre-apprenticeship × Women	1.05	.001
Race (white)		
Black/African American	-0.88	.000
Hispanic/Latinx	-0.08	.333
Native American	-0.29	.044
Asian	-0.15	.468
Trade (union carpenter)		
Nonunion carpenter	-0.75	.000
Union laborer	-0.07	.478
Nonunion laborer	-0.38	.004
Other union highway trade	-0.32	.000
Other nonunion highway trade	-1.05	.000
Age	-0.01	.020
Prior credits	0.00	.000
Cohort year	-0.16	.000
Portland metro area	0.13	.040
Any Program service	0.82	.000
Constant	1.83	.000
N		5,457

Source. Oregon Apprenticeship System.

I would not have made it without them [Oregon Tradeswomen]. I wouldn't have made it as a walk-in at all. (Hailey, white woman, completed)

[I received] emotional and very valuable support [from Oregon Tradeswomen]. I went to every single social hour I could manage in the first several years of my apprenticeship because I needed their help. I almost quit. Between Oregon Tradeswomen and one of my very favorite people in the [trade] union, I stayed . . . I didn't quit the union because I was totally emotionally battered every day of my apprenticeship [but] I had allies. I had somebody who could say "try this. Say that." Because all those women . . . they range from forties like me to early twenties. Which was really helpful. Because there's a generation or two there. They have different experiences and different information on how to survive than I do. All kind with different cultural backgrounds. It was really, yeah. It was awesome. It was awesome. (Donna, white woman, completed)

When I was in falling out terms with my apprentice program the first time, [Oregon Tradeswomen] and Penny [a staff member administering the Program] all kind of came together and tried to help and support me in any way they could for me to finish my apprenticeship program. And I thought that was very, very nice. (Louisa, white woman, completed)

Thus, an important function of pre-apprenticeship programs is to help retain apprentices as well as recruit new apprentices into the trades.

Addressing Retention through Financial and Non-financial Support

While race and gender are not criteria for participation, Program staff have made efforts to reach underrepresented groups in various ways, such as presenting information about the Program

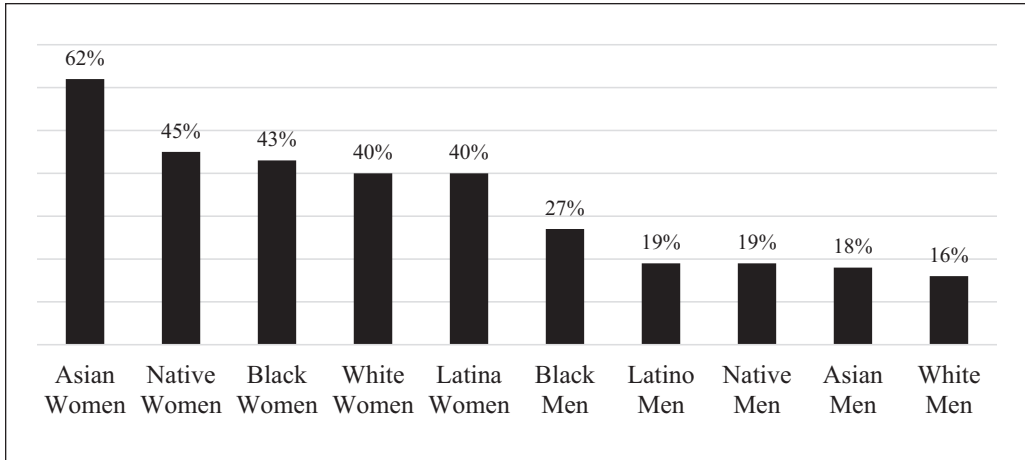


Figure 3. Percentage of apprentices in highway trades receiving services by race/ethnicity and gender, 2008–2019 cohorts.

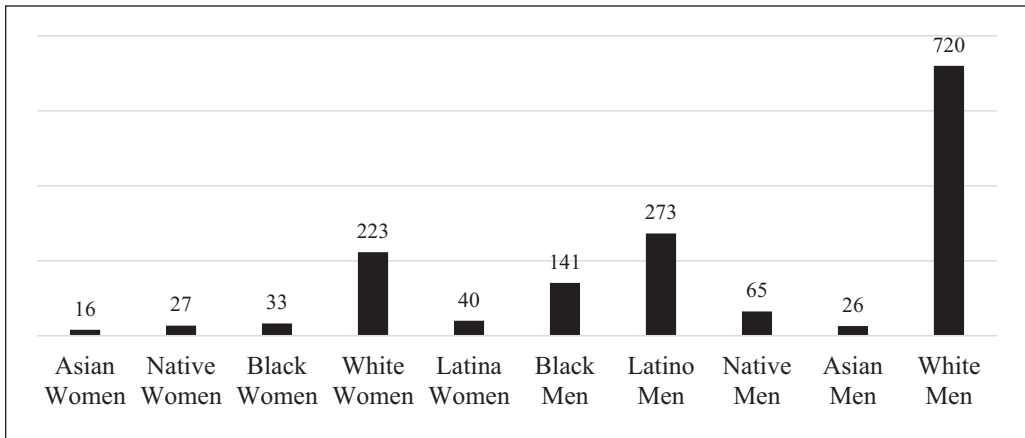


Figure 4. Number of apprentices in highway trades receiving services by race/ethnicity and gender, 2008–2019 cohorts.

during pre-apprenticeships, which primarily serve women and men of color. At least 40 percent of women apprentices in each racial/ethnic group have received services, compared with 16 percent of white men (see Figure 3). Among racial/ethnic minority men, Black men received services at the highest rate, with 27 percent of Black men receiving services (see Figure 3). However, about half of all service recipients were white men (see Figure 4). Over the lifetime of the Construction Workforce Development Program (2008–2019 cohorts of apprentices), a total of 1,564 apprentices have received supportive services from the Program (see Figure 4).

At the bivariate level, the supportive services provided through the Program have had a positive impact on completion rates; apprentices in eligible trades across all race/gender groups who received supportive services were more likely to complete an apprenticeship, relative to those who did not receive services (see Figure 5).¹¹

Importantly, the positive association between receiving any service and completion remains after accounting for factors associated with both receiving services and completion, including

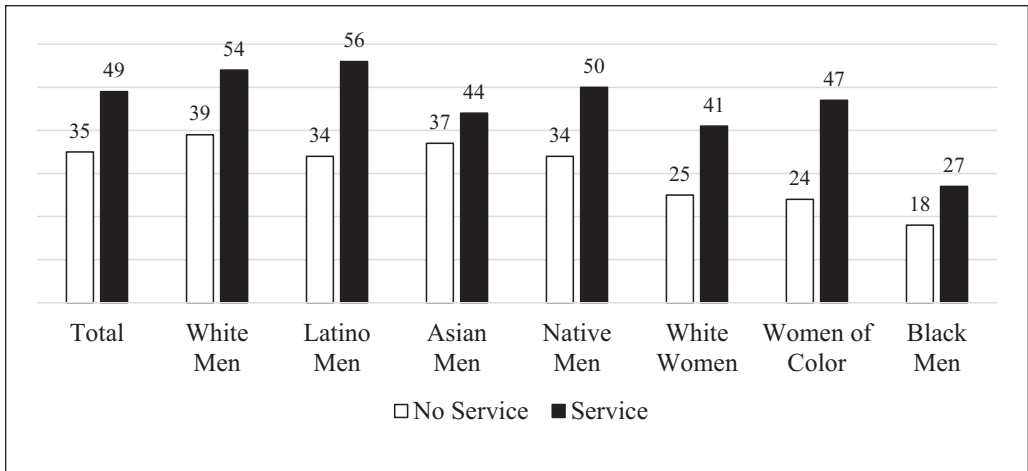


Figure 5. Percentage of apprentices in highway trades completing, by race/ethnicity and gender and service receipt, cohorts 2008–2019.

race/ethnicity, gender, age, trade, union status, prior credit, region, cohort, and pre-apprenticeship (see Table 4). Among apprentices in the 2008–2019 cohorts, the marginal effect of receiving support services on completing an apprenticeship is 0.16: Apprentices receiving any service were 16 percent more likely to complete an apprenticeship, relative to those not receiving any services (see Figure 6). This average estimated effect did not vary, at a statistically significant level, across race/ethnicity and gender groups. As shown in Tables 4 and 5, some but not all race/gender groups were statistically significant in regression models.

Each service has a positive and independent effect on completion after accounting for other services and confounders, with the exception of gas or travel services (see Table 5). Figure 6 shows the marginal effect of each service type after accounting for other Program services, race/ethnicity, gender, age, trade and union status, prior credit, region, cohort, and pre-apprenticeship. The only statistically significant difference in the estimated effect of Program services on completion, across race/gender groups, is for the effect of gas or travel: Receiving gas or travel assistance is positively associated with completion among men and women of color but not among white men or women (analyses not shown). In addition, among those receiving any services, the estimated effect of receiving both financial and non-financial services (relative to receiving only financial services) is positive and statistically significant. In the following sections, we discuss each type of service provided by the program: non-financial support, childcare, ready items, and gas or travel.

Non-financial Support

Based on results from multivariable models, we find that apprentices receiving non-financial services are, on average, 20 percent more likely to complete, relative to those not receiving non-financial services (see Figure 6). Research on persistence emphasizes the importance of feeling supported by and cared for by one's institution (Bergman et al. 2014; Mantz and Thomas 2003; Valenzuela 1999). Connecting with apprentices by asking (and providing) what they need is one way to be responsive to apprentices' needs and to generate a culture that emphasizes care.

Among the service recipients interviewed for this project, only four were recorded as receiving non-financial support as part of the Program in administrative data. However, when interviewed, 20 of 26 interview participants reported receiving some non-financial support from the Program.

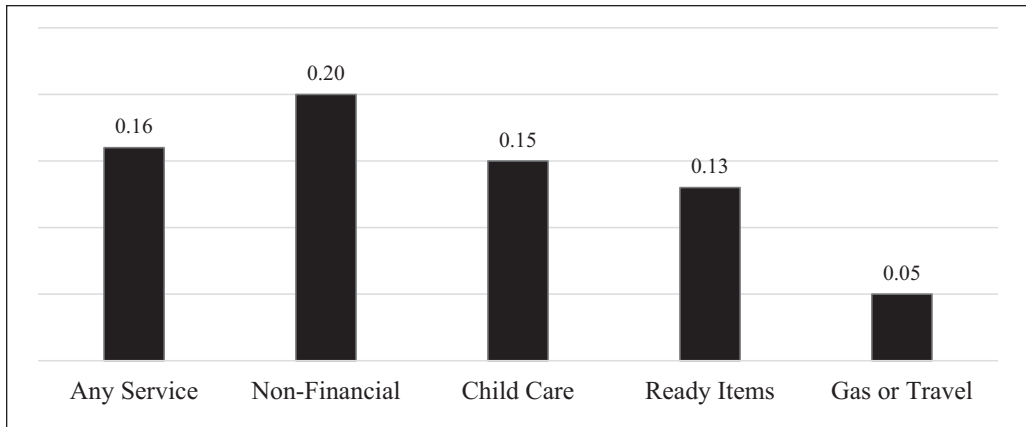


Figure 6. Marginal effects of receiving services on completion, 2008–2019 cohorts.

Table 4. Coefficients from Multivariable Logistic Regression Models Predicting Completion, Any Program Services.

Variable	Coefficient	p value
Any Program service	0.83	.000
Race (white men)		
Black/African American men	-0.98	.000
Hispanic/Latino men	-0.12	.152
Asian men	-0.30	.052
Native American men	-0.18	.432
White women	-0.49	.000
Black/African American women	-0.88	.007
Hispanic/Latina women	0.00	.987
Asian women	-0.70	.060
Native American women	-0.61	.247
Trade (union carpenter)		
Nonunion carpenter	-0.74	.000
Union laborer	-0.08	.407
Nonunion laborer	-0.37	.004
Other union highway trade	-0.32	.000
Other nonunion highway trade	-1.04	.000
Age	-0.01	.023
Prior credits	0.00	.000
Cohort year	-0.16	.000
Portland metro area	0.13	.038
Pre-apprenticeship	0.12	.433
Constant	1.81	.000
N		5,457

Source. Oregon Apprenticeship System.

The non-financial support came in multiple forms and from varied sources, and thus was not as accurately tracked as financial services. Some apprentices reported receiving ongoing non-financial support during apprenticeship from pre-apprenticeship programs Oregon Tradeswomen and

Table 5. Coefficients from Multivariable Logistic Regression Models Predicting Completion, By Service Type.

Variable	Coefficient	p value
Ready supplies	0.63	.000
Gas/travel	0.25	.046
Childcare	0.76	.000
Non-financial support	0.87	.000
Pre-apprenticeship	0.05	.768
Race (white men)		
Black/African American men	-0.97	.000
Hispanic/Latino men	-0.11	.169
Asian men	-0.28	.069
Native American men	-0.17	.449
White women	-0.54	.000
Black/African American women	-0.98	.004
Hispanic/Latina women	-0.03	.927
Asian women	-0.71	.060
Native American women	-0.57	.287
Trade (union carpenter)		
Nonunion carpenter	-0.73	.000
Union laborer	-0.10	.348
Nonunion laborer	-0.37	.005
Other union highway trade	-0.32	.000
Other nonunion highway trade	-1.04	.000
Age	-0.01	.023
Prior credits	0.00	.000
Cohort year	-0.15	.000
Portland metro area	0.13	.034
Constant	1.77	.000
N		5,457

Source. Oregon Apprenticeship System.

Constructing Hope (as described above); however, participants primarily reported that non-financial support from the Program came from Penny Painter, a staff person who administers the Program.

Several participants reported taking the budget class with Penny Painter and viewed it as useful. As one apprentice said: “It made me really look at my finances and where my money was going from working” (Alice, white woman, canceled). Another apprentice reported, “The content of the course had some good personal finance stuff in it that was good. Good reminders. It was good to take it with my wife” (Mike, white man, completed).

In addition to the formal budget class offered through the Program, apprentices received support from Penny Painter in the form of advice, listening, encouragement, and referrals to other organizations. The non-financial support was provided by phone and text as well as in-person meetings (often related to receiving financial support). Our research team came to speak of the positive impact of this support as the “Penny Painter effect.” Narratives from many interview participants demonstrated how Penny Painter provided non-financial support that related to the financial support (e.g., advising apprentices on what kinds of ready items they needed and why) but also providing more general advice and connecting apprentices to other services. For example,

I will say that Penny was the most amazing person, that if it wasn't for her, I wouldn't have stayed in the construction industry, to be a hundred percent honest. If it wasn't for Penny, I wouldn't be working for the union . . . When I had first started, I was having that problem with the racial experience [racism on the job site]. And she was explaining to me, and talking to me about stuff, and how we don't have a lot of minority leaders in leading positions, and how that sometimes we have to go through hard stuff. And at the end of it, it all is worth it, and sometimes it's not. But you'll never know if you just stop. And she told me that she had this money to help me get the clothes, and she helped me buy my boots. I didn't have money for steel toed boots. I was working in the rain and I didn't have any rain gear. I was soaking wet every day and just miserable, and she made sure that I had everything that I needed for that year. And it really changed my perspective on them, on the union, and how to go about life. (Josh, Black man, completed)

Well, besides the actual physical gear in itself, talking to her was very helpful. She's a very competent woman. She's been in the trade for a long time. And speaking with another woman that can give you the insight into working with other people, how to protect your gear, how to take care of it, and just being mindful of the gift that is given because it is a huge thing. Also, she was very informative of reminding us of different other supports that are out there. (Sarah, Black woman, canceled)

Not all apprentices who Penny Painter provided support to were able to complete their apprenticeship. For example, Sarah, quoted above, left the trades due to a lack of consistent work and also reported that experiencing harassment presented challenges during her apprenticeship. These were two of the most common challenges that led apprentices to leave the trades.

The reasons why these canceled apprentices left their programs were largely due to structural issues outside the scope of the Program. These include harassment and isolation, a lack of access to work (including being unfairly laid off and being out of work too much), a lack of mentorship or training, time away from home (due to long hours and/or long travel times), work expenses (e.g., tools, clothing, PPE, childcare, reliable transportation, travel expenses), and injury and concerns around safety (see also Kelly and Wilkinson 2020). However, there are some instances in which some additional non-financial support could have resulted in a resolution to a challenge that allowed the apprentice to stay in their program. For example, Alice (white woman, canceled) could potentially have completed her apprenticeship if she had been able to rotate out of a job that was far from home. Alice reported that the biggest challenge during her apprenticeship, and the reason she left, was because she had to leave her home at 3:30 a.m. and return at 7:00 p.m., which meant she rarely saw her small children. About working in the trades, she said, "It's an amazing opportunity and, if you don't have small children, it's the greatest ever. And I hope maybe one day to maybe possibly go back to it when my kids are a little older and in school." It is possible that with additional support and mentorship, Alice might have been able to negotiate a rotation to a job closer to home and complete her apprenticeship. However, it is not clear how likely this would be, given that the lack of opportunity to rotate out of jobs that are not a good fit is a larger structural issue within the apprenticeship system. In sum, the non-financial services provided by the Program were an important factor in the success of many of the interviewed apprentices who completed their apprenticeships; however, the Program was not able to resolve the issues leading to cancellation for the interviewed apprentices who did not complete.

Childcare

The current analysis, as well as past research, has shown that many parents in the trades have challenges with childcare, including both the cost and finding childcare that works with irregular and changing schedules (Hegewisch 2020). The adjusted estimated effect of receiving childcare subsidies on completion is 0.15 (see Figure 6). This analysis compares apprentices who received childcare subsidies with apprentices who did not; a more precise comparison group would be

only parents, or, ideally, parents who needed assistance but did not receive it. However, the administrative data used in this analysis do not include parental status.

Of the six interview participants who received childcare subsidies, all reported that the support was helpful and all three of the canceled apprentices who received childcare subsidies left their apprenticeship for reasons other than the cost of childcare. Two completed apprentices specifically cited the childcare subsidy as key to their success. As one apprentice stated,

[The child care subsidy was] extremely helpful. It really helped make the case to my partner that the sacrifices we were making were worth it and that my union cared about all of that. It was hugely helpful . . . I don't know that I would've made it probably to where I'm at now without that, for sure. (Mike, white man, completed)

As another apprentice reported, “[If I hadn't received a child care subsidy] I don't think I could have afforded to work. It was extremely helpful” (Alice, white woman, canceled). For some, the childcare subsidy alleviated all their problems with childcare, for example:

So another great thing about my time going through the apprenticeship program happened to be when my two youngest were not in school. They were in childcare [subsidized by the Program] . . . With the help of [ODOT and] BOLI, [childcare] was not much of a struggle at all. (Paul, white man, completed)

Other apprentices struggled with affording childcare after the funds from the Program were used. For example, Louisa used the childcare subsidy early in her apprenticeship; at the time she was interviewed, she said, “We can't afford childcare. So my significant other's mom watches the kids. Because it's just too expensive and it's not, we can't do it. No” (Louisa, white woman, completed). For some, the challenge of childcare was not only financial; maintaining consistent childcare with changing schedules was a challenge. As one apprentice stated, “And affording childcare for the weird hours and the [experience of] ‘Oh, now we need childcare next week, [now] we don't, now we do,’ [that] works yourself out of a job” (Terry, white man, canceled). While a lack of access to childcare was not one of the reasons Terry left the trades, he described this as a major challenge during his apprenticeship.

Ready Items

We also found that those receiving ready items were 13 percent more likely to complete than those not receiving ready items (see Figure 6). We learned that 24 of 26 interview participants received help with purchasing ready items, and many reported this support was critical to their success as they started their apprenticeship. Participants not only valued the ready items they received, but they also appreciated the advice they were given about tools, clothing, and PPE through working with Penny Painter, the staff member administering the Program. Apprentices described what would have happened if they did not have the tools they needed:

I wouldn't have been able to do it without the [ODOT-]BOLI program. (Mia, multiracial woman, completed)

[If I hadn't received help buying ready items] it would have been to a point where I wouldn't have taken any tools to work and I would have had to kept asking other people to let me borrow some tools and that was already going bad, so once I had my own tools, that was a stress reliever. They were good tools too, so it made it much better. (Pablo, Latino man, canceled)

[Penny Painter] helped me get my first set of tools, bags, and boots and rain gear, and I wouldn't have had those things has she not been able [to help me]. It'd have been a significant problem. I don't

know if I would have been able to make out my first couple of jobs not having no tools, and I obviously I couldn't afford them when I first started . . . I'd say [this trade] was a great career choice and the [ODOT-]BOLI program definitely helped me on that path and put me in a position to be successful. (Alex, Black man, completed)

I basically started the first day of my first job without any tools or anything. And then later that day, when I talked to Penny [Painter], we went to the store and I was able to get boots and stuff. So, it was very necessary considering the situation I was in. (Kelsey, white woman, canceled)

A few apprentices noted that the support was helpful but not critical, for example:

[If I hadn't received that help] I'd say [it would have been] a minor problem. I still could've gone out and purchased them myself, but that's money that could have been spent saving up for the house or making the truck payment. So it enabled me to use that money for other things. (Andrew, white man, completed)

Receiving ready items is a particularly important service because it has one of the largest impacts on completion of all financial services types, reaches many apprentices, and connects apprentices with the Program early on in apprenticeship, which creates opportunities for Program staff to also provide non-financial support throughout the apprenticeship. We identify additional support in buying and caring for ready items as a need among apprentices that could be addressed by expanding the Program or through other organizations such as unions or employers.

Gas/Travel

The estimated marginal effect of gas/travel is relatively small (.05; see Figure 6), although receiving gas/travel had a larger estimated effect on people of color, relative to white workers (analysis not shown), and this interaction was statistically significant in multivariable models. The qualitative interviews conducted for this project documented that some apprentices struggled with out-of-town work, both paying for travel expenses and the long hours away from home. It may be that this level of support for travel was too low and apprentices need additional assistance covering the expenses associated with out-of-town work. It may also be that for some apprentices, it is the time away from home rather than the cost of travel that poses the biggest issue.

Four completed and two canceled apprentices received support for travel (e.g., gas, hotel, meals). Some participants found this type of support very helpful, for example:

Yes, there was a couple of times where I didn't have very much work. So it helped a lot, being able to get that gas assistance. And it would have been a huge problem without it. I wouldn't have made it to work. (Alice, white woman, canceled)

For others, the limited funds available for travel were problematic for those who had to work out of town for extended periods. For those who worked out of town for extended periods of time, even regular paychecks were not sufficient to maintain the expenses of their household as well as cover the expenses of living away from home. The cost of travel and the associated challenge of being away from home for long periods were major issues for 3 of the 10 canceled apprentices interviewed.

Hardship Funds

Starting in 2016, the Program added hardship funds to address larger one-time issues facing apprentices (too few participants have received these services to be included in the quantitative

analyses above). Four apprentices in this study received hardship funds, including two completed apprentices and two canceled apprentices. These apprentices received support when they had an unexpected cost associated with transportation or housing, for example:

I had an instance where I was laid off and unemployment wasn't kicking through for me at the time, so I had needed help with rent assistance. And I talked to Penny Painter and she got me in line through the [ODOT]-BOLI program, and I was able to pay my rent so I can stay where I was living at. (Mia, multiracial woman, completed)

For the canceled apprentices, hardship funds extended the amount of time they were able to stay in their apprenticeships. Ultimately, they left the trades for reasons not associated with the financial challenge that led them to request hardship funds. Our interviews do suggest that there remains an unmet need among apprentices for additional support related to budgeting, applying for unemployment, and accessing other financial supports within and outside the trades.

Discussion and Recommendations

Overall, pre-apprenticeship and supportive services funded by the Highway Construction Workforce Development Program are increasing the recruitment and retention of a diverse workforce, and our primary policy recommendation is that these efforts should be continued and expanded. Ultimately, pre-apprenticeship remains, to date, the only approach that we have empirically documented to increase the recruitment of women into the trades in Oregon (we have not assessed the impact of other approaches currently being used, such as job fairs and school outreach). While both financial and non-financial services support completion, we recommend more funding should be directed toward non-financial services, as these, especially in combination with financial services, have the biggest impact on completion. These findings suggest that many apprentices would benefit from “wrap-around” services that connect apprentices with financial and non-financial support available through the Program as well as additional support available within the trades and in broader communities. As noted in our findings, we identified areas where apprentices may need additional support on topics, such as staying consistently employed (including how to deal with discrimination in being hired and let go); budgeting, applying for unemployment, and accessing other financial supports within and outside the trades; dealing with harassment and isolation; accessing mentorship and on-the-job training; addressing the challenges of working out of town and other work/life conflict issues; and buying and caring for the correct tools, clothing, and PPE. While some additional support could come from an expansion of the Program, to fully meet the needs of apprentices across the industry (not just those in the highway trades), coordinated efforts across stakeholder groups would be needed. It is notable that completion rates vary across trades, which suggests that further attention is needed on the differing needs of apprentices in different trades. Our findings also indicate that additional data collection by public agencies that oversee apprenticeship could help better understand the impact of retention programs in the trades. In addition to the demographic information currently collected, having information on parental status, prior incarceration, and economic hardship (e.g., receiving public assistance) would be helpful for understanding the impact of the programs as well as inform policy decisions.

Scholars have argued for a variety of ways to address gendered and racial inequalities within the trades: more inclusive recruitment strategies (Jenkins et al. 2019; Simon and Clarke 2016), additional emphasis on mentoring (Galea et al. 2015; Jenkins et al. 2019; MacIsaac and Domene 2014; Simon and Clarke 2016; Taylor et al. 2015; Wright 2016), and addressing the formal rules of trades organizations to address institutionalized inequalities (Galea et al. 2015). Advocates for a diverse construction trades workforce echo these calls and also suggest additional efforts, such

Box 1. Structural Changes to Support Retention.

- Expand pathways into the trades, such as through pre-apprenticeship
- Promote respectful workplaces, such as through revising employer policies and practices and providing a system for reporting harassment and discrimination across job sites, and requiring training and ongoing booster sessions for all workers
- Promote teaching and mentoring such as through employer policies and trainings and ongoing booster sessions for apprentices and their mentors
- Revise current processes for assigning work to ensure equal access to on-the-job hours for women and people of color
- Allow apprentices to rotate out of jobs that require long hours, are far from home, are not ideal schedules, do not provide opportunities to learn the skills of the trade, or are otherwise not a good fit
- Provide funding for travel for apprentices' out-of-town work
- Provide "wrap-around" financial and non-financial support for apprentices

as respectful workplace trainings and workforce participation goals (Bridges et al. 2019; Haines et al 2020; Hegewisch et al. 2014; Hegewisch and O'Farrell 2014, 2015; Moir et al. 2011; National Women's Law Center 2014; Policy Group on Tradeswomen's Issues 2016). The findings of this study suggest that while retention can be improved by providing supportive services to individual apprentices, larger structural changes are also needed to support a diverse construction workforce. As noted above, the Program evaluated here has met many apprentices' needs for support and has improved completion rates for Program participants; however, to fully address these issues across the construction industry, coordinated efforts and increased support from private industry are needed. Drawing together the recommendations from the current study, previous scholarship, and calls from advocates, we suggest a range of recommendations for addressing inequalities in the trades, shown in Box 1. Some funding for these changes could come from an investment of public resources but would need to be predominantly supported by private industry investing in its own future workforce. These structural changes will make the apprenticeship system more effective and efficient, and provide greater opportunities for a diverse population to enter into the trades.

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Notes

1. See <https://www.bls.gov/cps/cpsaat11.htm>.
2. More information at <https://www.oregon.gov/odot/Business/OCR/Pages/Workforce-Development.aspx> and <https://www.oregon.gov/boli/apprenticeship/Pages/support-for-heavy-highway-apprentices.aspx>.
3. Oregon Law ORS 184.866 "Highway Construction Workforce Development" states, "Of the federal funds received each biennium by the Department of Transportation pursuant to 23 U.S.C. 140(b), the

department shall expend one-half of one percent up to an amount of \$2.1 million to increase diversity in the highway construction workforce and prepare individuals interested in entering the highway construction workforce by conducting the activities described in subsection (3) of this section.”

4. For more information, see <https://tradeswomen.net/>.
5. For more information, see <https://www.constructinghope.org/>.
6. For more information, see <https://pybpdx.org/>.
7. A note on race/ethnicity: In the Oregon Apprenticeship System (OAS) data, race and ethnicity data are collected through the Apprenticeship Registration Agreement form on which apprentices are prompted to report their race and ethnicity by checking one box under the abbreviations “WH” (white), “BL” (Black), “AI” (Native American or Alaska Native), “AS” (Asian American), or “HI” (Native Hawaiian or Other Pacific Islander). In interviews, participants were asked the open-ended question: “What is your race or ethnicity?” Throughout this article, we use “people of color” to refer to anyone who self-identifies with any race and ethnicity combination other than non-Hispanic and white.
8. A total of 30 interviews were conducted; two were excluded from the analysis because of issues with the audio recording and two were excluded because when interviewed, the apprentices were active rather than canceled as indicated in the administrative data.
9. The research design initially called for in-person interviews in the Portland and Salem areas and telephone interviews for participants outside driving distance. However, COVID-19 emerged as we began the project, necessitating all interviews be conducted over the telephone.
10. Among women, 53 percent of pre-apprenticeship program graduates completed while 27 percent without pre-apprenticeship completed. Among men, 33 percent of pre-apprenticeship program graduates completed while 39 percent without pre-apprenticeship completed. These gender differences are statistically significant.
11. In Figure 5, we aggregated women of color into a single group as there were fewer than 30 women of color in highway trades apprenticeships in the study period.

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