RESEARCH ARTICLE

Occupational Injuries During the First Month of Tenure Among Teen Workers in Oregon: A 10-Year Examination of Workers' Compensation Claims

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Abstract: *Background:* Teenage workers have unique occupational injury risks, raising the need to evaluate preventive training programs. This study examines the risk of occupational injury for workers under 19 before and after the release of Oregon Young Employee Safety Coalition (O[yes]) online safety awareness training in 2017. *Methods*: The Employed Labor Force tool was used to estimate the annual size of the teen workforce from 2013 to 2022 in Oregon. The count and share of first-month injuries (N=18,694) among all worker compensation claims (N=166,594) were also examined. General linear models estimated first-month injury risk by age group, controlling for sex, occupation, and insurer. *Findings*: Teenage workers' first-month injury risk per 1,000 workers was similar before (2013–2016) and after (2017–2022) the O[yes] training (7.8 vs. 7.6). However, compared with older workers, the share of first-month injuries among all claims for teen workers decreased (RR: 0.88, $p < .001$), with no significant change for other ages. *Conclusions*: After the introduction of O[yes] training, the estimated injury risk did not change. However, the relative proportion of first-month injuries among teenage workers was lower than before. Further research is needed to evaluate training effectiveness and additional contributing factors.

Keywords: teen worker safety, occupational injuries, first-month tenure, workers' compensation claims, onboarding risk

Introduction

The 30-day period immediately following a new employee's start date is critical for occupational injuries (Breslin & Smith, 2006; Runyan et al., 2007). The elevated risk can be attributed to several interrelated factors. New hires may not receive thorough instruction on safe practices or may not receive any safety training at all (Chin et al., 2010; Smith & Mustard, 2007; Zierold & Anderson, 2006). This lack of proper training can lead to mistakes or hazardous conditions, increasing the likelihood of injury. Additionally, the stress of adapting to new work environments and expectations can impair cognitive function and decision-making, potentially leading to errors that might otherwise be avoided. The pressure to perform and prove oneself can also result in overexertion and the neglect of safety procedures, such as using Personal Protective Equipment (PPE; Runyan et al., 2008), further increasing the chances of injury.

The first month of employment is widely recognized as a period of elevated injury risk, especially for teenage workers (Chin et al., 2010; Jennifer et al., 2018; Runyan & Zakocs, 2000). Teens often enter the workforce with little to no prior job experience and limited familiarity with hazards and safety protocols. About half of working adolescents and those injured on the job report receiving no safety training (Breslin & Smith, 2005). Teen workers are also more likely to be employed in high-risk industries such as construction, manufacturing, and agriculture (Runyan et al., 2005; Ward et al., 2010). These positions are often entry-level, part-time, seasonal, or temporary (Tucker & Turner, 2013). The COVID-19 pandemic significantly reduced job opportunities for teens, as sectors such as retail, food service, and hospitality, which commonly employ young, inexperienced workers, were heavily impacted. The teen unemployment rate peaked at 32.1% in April 2020, more than twice the rate from the prior year (Inanc, 2021). According to the U.S. Bureau of Labor Statistics (2024), around 70% of workers aged 16 to 19 have job tenure of 12 months or less, reflecting the dominance of short-term and seasonal work. The median tenure for teen workers ranges from 0.7 to 0.9 years (8–11 months), consistent with the high turnover rates observed

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Applying Research to Occupational Health Practice

This study highlights the unique occupational injury risks faced by teenage workers and evaluates the impact of the Oregon Young Employee Safety Coalition (O[yes]) online safety training program introduced in 2017. Findings showed that while the overall risk of first-month injuries among teens remained consistent before and after the program, the proportion of first-month injuries among teen workers relative to all claims decreased significantly. This suggests a potential shift in injury patterns or reporting among this group. For occupational health practitioners, particularly in nursing, these findings emphasize the need for targeted interventions that address the specific vulnerabilities of young workers during their early employment period. It also underscores the importance of continually evaluating training programs and workplace safety measures to ensure they effectively mitigate risks. Future efforts should focus on enhancing training delivery and exploring additional factors contributing to injury prevention for this population.

in teen-dominated industries. This figure may also reflect the age at which employment begins; for example, a 16-year-old may accumulate more tenure than a peer starting work at 19 (U.S. Bureau of Labor Statistics, 2024).

Teenage workers often feel intimidated or hesitant to speak up due to their limited tenure, fear of appearing incompetent, or concern over potential backlash from more experienced colleagues or supervisors (Tucker & Turner, 2013). Communication barriers can lead to unreported hazards, overlooked safety violations, and missed opportunities for corrective action. Therefore, the need for improved communication is crucial, especially when teen workers are faced with tasks they are unfamiliar with. Teenage employees may face communication barriers, feeling less comfortable seeking help or clarification from supervisors and colleagues, which can further compromise their safety. Moreover, young workers may lack the maturity and judgment required to navigate complex or hazardous work environments safely. Furthermore, some teenage workers may exhibit a sense of invulnerability and overconfidence, leading them to take unnecessary risks or ignore safety guidelines (Breslin et al., 2007; Zierold & McGeeney, 2016). Teenage workers are also still developing cognitively and physically, which can further increase susceptibility to injury (Washington State Fatality Assessment and Control Evaluation (FACE) Program, 2024). The combination of inexperience, job characteristics, a higher propensity for risk-taking, and the pressures of acclimating to a new job environment significantly elevates the risk of injury for this age group. Their limited work history often means they may not recognize hazards or have a complete understanding of how they can be impacted by exposure to risks.

Reducing injuries among teen workers during their first month of employment is clinically significant because this period is when they are most vulnerable to accidents due to their lack of experience and unfamiliarity with workplace hazards (Miller & Salazar, 2004). Early injuries can have long-term physical, emotional, and financial consequences, potentially leading to chronic health issues or psychological impacts such as anxiety and fear of returning to work. Moreover, injuries sustained during this critical period can hinder a teen's development of essential skills and confidence necessary for future employment (Rubenstein et al., 1999).

Focusing on the risk of occupational injury during the first month of tenure is crucial to avoid selection bias, which can occur when data excludes workers who are injured early and subsequently leave their jobs (Eisen & Robins, 2001; Huizinga et al., 2019). New employees are particularly vulnerable due to their lack of experience and familiarity with safety protocols, making this period critical for accurate risk assessment and the implementation of targeted preventive measures. By addressing this early high-risk phase, there is an opportunity for a more comprehensive understanding of occupational hazards and more effective safety interventions. Insights gained from a focus on this period can inform the development of targeted interventions and policies aimed at reducing the risk of injury for new employees.

The Oregon Young Employee Safety (O[Yes]) Coalition

The Oregon Young Employee Safety Coalition (O[yes]), established in 2007, is a comprehensive initiative dedicated to promoting workplace safety among young workers. Led by relevant occupational health and safety stakeholders, O[yes] gathers representatives from OR-OSHA, SAIF (the leading workers' compensation insurer in the state), academia, practitioners, and employers. As part of this initiative, O[yes] developed a web-based safety awareness training program, released in December 2016. This voluntary course was targeted at teens entering the workforce, about to start, or during the early days of their jobs. The training was promoted statewide through partnerships with schools, employers, and youth-serving organizations. This training was designed to educate young workers in Oregon about workplace safety awareness, and the training was posted on the OR-OSHA training website (Oregon Occupational Safety and Health Administration, 2017). Mindful that teens and young adults are at a higher risk of occupational injuries, O[yes] aims to equip them with the knowledge and skills necessary to protect themselves in various work environments. Explicitly aimed at teenagers and young adults entering the workforce, the program focuses on raising awareness about the potential hazards they might encounter in different jobs. The training, which is based on the CDC's Talking Safety curriculum (Guerin, Okun et al., 2020) and AIHA's Safety Matters, covers essential topics such as young worker injuries, finding hazards, making the job safer, understanding workers'

rights and responsibilities, and being prepared to take action. The program also emphasizes the importance of communication, encouraging young workers to speak up about safety concerns and to seek help when needed. Teens can access and complete the training independently at any time, regardless of their current or potential employers. The program offers a range of online tools, including e-learning modules, safety quizzes, and informational videos, making it accessible to young workers regardless of their location. These resources are designed to be self-paced, allowing users to learn at their own speed (Oregon Occupational Safety and Health Administration, 2017).

O[yes] partners with high schools, community organizations, and employers to integrate safety training into educational curricula and workplace onboarding processes. To further engage young workers and students, O[yes] sponsors an annual media contest that encourages participants to create short films and graphic designs about workplace safety. This contest not only raises awareness about important safety issues but also empowers young people to become advocates for safety in their communities (Oregon Young Employee Safety Coalition, 2024). Besides online training, O[yes] conducts in-person workshops and training sessions across Oregon, often in partnership with local businesses, schools, and community organizations. These sessions offer hands-on learning opportunities, allowing participants to practice safety protocols, engage in discussions about real-world safety challenges, and receive guidance from safety professionals.

Study Aims

This study examines whether teen workers have a lower risk of occupational injury during their first month of employment in Oregon compared to older workers during the same early tenure period. In addition, it compared whether this risk has been reduced in the 5 years after the O[yes] training was released (2017–2022) compared with the 4 years before its availability (2013–2016). The O[yes] online training targeted to teen workers was launched on December 14, 2016, so an indicator variable was created for the period before (2013–2016) and after (2017–2022) its release. Since the launch of the O[yes] online training, Oregon OSHA has issued over 6,552 certificates of completion to workers who have completed the program. However, no data are available regarding the number of actual teen workers who complete the program, despite its exclusive design for this population.

This study describes the risk faced by teenage workers from 2013 to 2022, based on two key indicators: (i) the rate of injuries during the first month of tenure, and (ii) the proportion of first-month injuries in the workers' compensation claims dataset. Injuries that occurred during the first month of tenure were described in terms of occupation as well as the nature, events, and body parts affected.

Secondary data analyses of workers' compensation claims in Oregon were conducted to achieve the study aims. Oregon's workers' compensation system is administered by the Workers' Compensation Division (WCD) of the Oregon Department of Consumer and Business Services (DCBS). The workers' compensation system in Oregon is a no-fault insurance program designed to provide medical benefits and wage replacement to employees who suffer work-related injuries or illnesses. In Oregon, almost all employers are required to provide workers' compensation coverage for their employees. Certain categories of workers, such as independent contractors and volunteers, may be exempt from mandatory coverage, though employers can choose to provide coverage voluntarily. To be eligible for workers' compensation benefits, an employee must sustain an injury or illness that arises out of and in the course of employment. Workers' compensation in Oregon is funded through employer-paid insurance premiums.

Methods

Datasets

This study relied on data from two sources: (1) the Employed Labor Force (ELF) Query System to calculate the number of young workers per year, and (2) the Oregon workers' compensation claims dataset. The Employed Labor Force (ELF) Query System is a publicly available online data tool developed and maintained by the National Institute for Occupational Safety and Health (NIOSH). The ELF system provides comprehensive estimates of employment across various industries and occupations in the United States. It integrates data from multiple federal sources, including the U.S. Census Bureau and the Bureau of Labor Statistics.

Claim information was obtained after signing a Data User Agreement with the Workers' Compensation Division (WCD) in Oregon. A dataset including every claim in the system from January 1, 2013, to December 31, 2022, was obtained (N=213,854). The variable list for the shared and curated dataset was defined in consultation with WCD data custodians to protect the confidentiality of the claimants. As such, some information was either unavailable or restricted. Each claim included information on the location of the injury in each of Oregon's 36 counties. The Institutional Review Board at Oregon Health & Science University also reviewed and approved the partnership with the WCD and data acquisition and management procedures (protocol STUDY00024442).

Outcome

Tenure information was recorded in the dataset depending on the length of employment at the time of injury and was coded as (i) 1st month, (ii) 2nd and 3rd months, (iii) >3rd to 6th months, (iv) >6th to 12th months, (v) less than 2 years, (vi) >2 to 5 years, (vii) >5 to 10 years, (viii) >10 to 25 years, and (ix) more than 25 years of tenure. Any injury claim that occurred during the first month was considered the main outcome and treated as a binary variable (yes vs. other tenure). Tenure information was missing for 41,103 claims or 19.2% of the dataset.

Age

The dataset had a continuous variable for claimant age at the time of injury. Dates of birth were absent, but a continuous variable with years of age was present. Age was recategorized as: (i) ≤19 years (i.e., teen workers), (ii) 20 to 24 years, (iii) 25 to 40 years, (iv) 41 to 65 years, and (v) >65 years of age. Age was missing for only 323 claims (0.15%).

Occupation

Occupation was coded based on the Standard Occupational Classification (SOC) system. Each claim entry was coded using six digits of the system. However, for simplicity, these analyses here only use 22 major codes, generally represented by two digits. Military occupations were excluded from the dataset. The dataset had missing occupational information for only 4.39% of the cases. Additionally, a high-claim-rate occupation binary variable was created to indicate the occupations that accounted for 5% or more of claims among teenage workers.

Severity, Nature, Part, and Event of Injury

To establish the severity of the claim, the dataset included a variable indicating whether the event required hospitalization for at least one night. The variable was coded as yes, no, or unknown, with 261 missing entries. The dataset classified each claim based on the 2012 version of the Occupational Injury and Illness Classification System (OIICS); a standardized system developed by the Bureau of Labor Statistics (BLS). OIICS codes have a hierarchical design, which allows for detailed classification across various categories, such as injury sources, events, and exposures. The dataset had up to four digits, but only the nine major codes are described here for simplicity. Less than 2% of the cases had missing information regarding nature, part, and event.

Sex

The dataset included a binary variable, classifying claimants as female or male, with only one entry without such information.

Insurance Type

Each claim had complete information about the insurer. This variable was coded as (i) SAIF (the leading insurer in the state with more than half of the market share, (ii) private, (iii) self-insured, (iv) other type of insurance, or (v) non-compliant employer.

Analysis Plan

To construct injury rates of teen workers, the numerator consisted of the number of claims recorded during the first month of employment from 2013 to 2022 (n=166,594). The denominator estimates were obtained from the ELF, requesting the number of workers by age in Oregon for each year. Data on the number of workers in their first month of employment across all age groups were not available, which limited the ability to calculate comparable first-month incidence rates by age. However, prior research suggests that up to 30% of teen work-related injuries occur within the first month of employment, including among teen workers who ultimately remain on the job longer (Breslin & Smith, 2006). As such, this analysis relies on assumptions that approximately 30% of teen workers are employed for 1 month or less during a given year.

Examinations of injuries before and after the O[yes] online training were based on general linear regression models for (i) the rate of injuries during the first month of tenure (i.e., assuming that 30% of the workforce per year worked only 1 month as explained above), and (ii) the proportion of first-month injuries in the workers' compensation claims dataset. Regression models included an interaction term between teenage worker status and the period before and after the introduction of the O[yes] training to assess whether the availability of the training modified the risk of occupational injury among teenagers. Another regression model included a second interaction term to investigate whether the risk of occupational injury among teenage workers differed across high-risk occupations compared to other occupations before and after the availability of the O[yes] training program. General linear regression models were adjusted for sex, occupation, and type of insurer. The PROC GENMOD procedure in SAS 9.4 (SAS Institute, 2023) was employed, which allowed for the modeling of the log of the expected count using a Poisson distribution. To improve interpretability, exponentiated coefficients (i.e., rate ratios) are presented in Table 2. These reflect the multiplicative change in the rate of injury claims associated with a one-unit change in the predictor variable, holding other covariates constant. Given that claims data were clustered by county, the analyses accounted for this clustering in our model by adjusting the standard errors using the robust estimator with a compound symmetry estimator for variances. Only complete case data were used; missing data were handled by excluding incomplete responses from the dataset.

Results

Descriptive Statistics

Table 1 shows the distribution of claims that occurred during the first month of employment by year (N=18,694). Over the 10-year period, 17,787 injury claims were reported during the first month of tenure, accounting for 10.68% of the total number of claims. While teenage workers represented 2.79% of total claims (n=6,120), their proportion of claims during the first month of tenure was higher (8.42%) than for other age groups.

The vast majority (96.06%) of first month claims among teen workers involved traumatic injuries and disorders. Upper extremity injuries were most common (39.12%), followed by lower extremities (28.64%) and the trunk (15.42%). Multiple body parts accounted for 7.28%, while head (6.81%), neck (1.07%), and body system injuries (1.67%) made up the rest. The leading causes of injury were contact with objects or

Table 1. Distribution (%) of Workers' Compensation Claims During the First Month of Employment in Oregon (2013–2022; *N* = 18,694

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
N	**14,786**	**15,923**	**15,643**	**16,121**	**16,585**	**16,252**	**17,224**	**16,666**	**18,192**	**19,202**
Age (years)										
≤19 years	7.16	7.94	7.55	9.3	9.25	7.41	7.92	8.56	9.61	8.94
20–24	14.99	17.17	17.32	14.34	14.46	16.72	17.04	18.59	20.77	19
25–39	41.51	38.75	38.65	39.23	39.88	38.44	38.44	39.86	38.38	38.61
40–65	35.45	34.97	35.23	35.21	34.71	35.35	33.98	30.75	29.4	31.26
≥65	0.89	1.18	1.26	1.92	1.7	2.08	2.62	2.24	1.84	2.2
Sex										
Female	26.29	28.27	29.48	31.13	31.82	32.66	35.92	35.28	37.12	37.72
Male	73.71	71.73	70.52	68.87	68.18	67.34	64.08	64.72	62.88	62.28
Insurer type										
SAIF	56.35	54.49	53.74	55.19	53.09	54.43	46.67	51.36	52.89	38.23
Non-compliant	0.22	0.19	0.6	0.36	0.51	0.17	0.37	0.22	0.15	0.05
Self-insured	7.24	7.56	8.51	10.5	10.15	8.98	10.07	10.96	12.28	10.29
Private	34.12	35.34	35.23	32.03	33.86	33.84	39.7	32.72	28.58	22.65
Other	2.07	2.42	1.92	1.92	2.38	2.58	3.2	4.74	6.11	28.78
Standard Occupational Classification (SOC)										
All Other (00)	2.73	2.11	2.1	2.1	1.64	1.18	1.15	1.47	1.07	1.12
Management (11)	1.26	1.12	1.2	1.44	1.53	1.12	1.31	1.42	1.36	1.36
Business and Financial Operations (13)	0.37	0.25	0.3	0.36	0.28	0.17	0.52	0.27	0.15	0.28
Computer and Mathematical (15)	0.07	0	0.06	0	0.06	0	0.1	0.05	0.05	0.05
Architecture and Engineering (17)	0.3	0.25	0.18	0.18	0.17	0.06	0.26	0.16	0.29	0.23
Life, Physical, and Social Science (19)	0.3	0.19	0.18	0.24	0.23	0.11	0.47	0.33	0.19	0.28
Community and Social Service (21)	0.44	0.5	0.3	0.66	0.57	0.56	0.47	0.49	0.15	0.51
Legal (23)	0.07	0.12	0	0	0	0	0.16	0.05	0.05	0
Educational Instruction and Library (25)	0.52	0.74	1.14	1.44	1.02	1.01	1.05	0.6	1.07	1.08

(continued)

Table 1. (continued)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
N	14,786	15,923	15,643	16,121	16,585	16,252	17,224	16,666	18,192	19,202
Arts, Design, Entertainment, Sports, Media (27)	0.96	0.43	0.78	1.56	0.34	0.51	0.47	0.33	0.1	0.47
Healthcare Practitioners and Technical (29)	1.26	0.93	1.08	0.78	1.3	0.79	1.1	1.15	2.33	2.53
Healthcare Support (31)	5.76	5.08	5.33	3.9	4.54	3.76	2.88	4.85	6.31	6.6
Protective Services (33)	3.03	2.6	2.46	2.4	2.61	2.24	1.89	4.85	3.64	1.92
Food Preparation and Serving Related (35)	6.43	7.56	7.31	6.42	8.56	7.91	8.02	4.58	5.39	6.79
Building, Grounds Cleaning and Maintenance (37)	6.13	6.45	7.91	7.14	6.92	6.45	5.66	4.53	4.95	5.19
Personal Care and Service (39)	1.99	1.86	2.4	2.52	1.93	2.53	2.46	2.56	2.23	2.29
Sales and Related (41)	2.44	2.73	3.54	4.8	3.74	3.7	3.51	3.65	4.22	4.07
Office and Administrative Support (43)	3.1	3.47	3	3.48	2.89	3.42	4.77	7.42	8.83	7.81
Farming, Fishing, and Forestry (45)	13.37	10.04	10.13	8.76	8.56	7.35	6.35	4.53	4.08	3.51
Construction and Extraction (47)	14.11	14.88	13.66	11.94	13.05	12.35	11.22	10.25	9.51	9.69
Installation, Maintenance, and Repair (49)	4.51	4.22	3.59	3.9	4.03	3.42	4.14	4.69	4.46	4.49
Production (51)	12.63	13.45	13.54	14.58	13.27	15.94	14.11	14.72	13.83	11.84
Transportation and Material Moving (53)	18.24	21.02	19.83	21.42	22.75	25.42	27.9	27.04	25.76	27.89

equipment (36.6%), overexertion and bodily reaction (28.17%), and falls, slips, and trips (20.63%). Other events included exposure to harmful substances (5.8%), transportation incidents (4.81%), violence (2.07%), fires/explosions (0.13%), and non-classified events (1.74%). Between 2013 and 2022, 48 first-month injuries required hospitalization, about 4.7 per year, with no change in the annual average over the decade.

Risk of Injury During the First Month of Tenure Over Time and Occupation

Figure 1 shows the injury rate per 1,000 for teenage workers (≤19 years) in Oregon from 2013 to 2022. For this rate, the numerator consisted of the number of claims by year (Table 1), while the denominator was based on estimates of the size of the teen workforce from the ELF system, assuming that 30% of the workforce for this age group only works for up to a month. The average rate in that period was 7.8 injuries per 1,000 workers. There were fluctuations in the injury rate, ranging from a low of 6.3 in 2013 to a high of 9.4 in 2021, when the number of young workers was lower than in the years prior due to the onset of the COVID-19 pandemic in 2020. For instance, in 2019, the estimated number of workers under 19 was 84,378; however, this number decreased to 76,008 in 2020 and 72,759 in 2021.

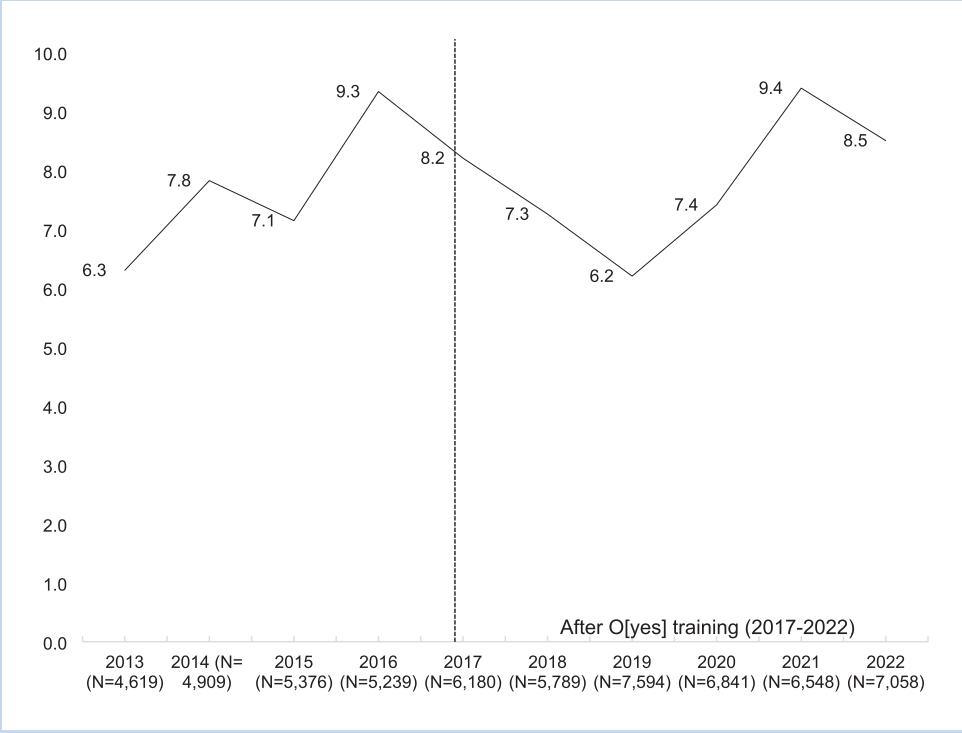

Figure 1. Estimated rate per 1,000 workers of occupational injury during the first month of employment for teenage workers in Oregon (2013–2022)

Note. **Rates were calculated using the number of accepted first-month claims as the numerator (see Table 1) and estimated teen workforce size from the Employed Labor Force (ELF) system as the denominator, assuming that approximately 30% of teen workers are employed for 1 month or less.**

The assumed rate per 1,000 of teen workers experiencing an injury during their first month of employment was similar before and after the release of the O[yes] training (7.6 vs. 7.8).

Figure 2 shows the results from the GLM, estimating the risk of an injury during the first month of employment by age group, relative to other tenures. The reference group consisted of workers aged 40 to 65 years, who accounted for the majority of the claims. After the O[yes] training was released and compared to other age groups, the risk of being injured during the first month of tenure among teen workers decreased relative to the 4 years before its release (RR 0.84, 95% CI [0.76, 0.93], $p = .0005$). Other age groups did not experience changes. This estimate did not change after controlling for sex, occupation, and insurance type (RR 0.88, 95% CI [0.81, 0.97], $p = .0094$). The estimates are similar before and after the COVID-19 pandemic.

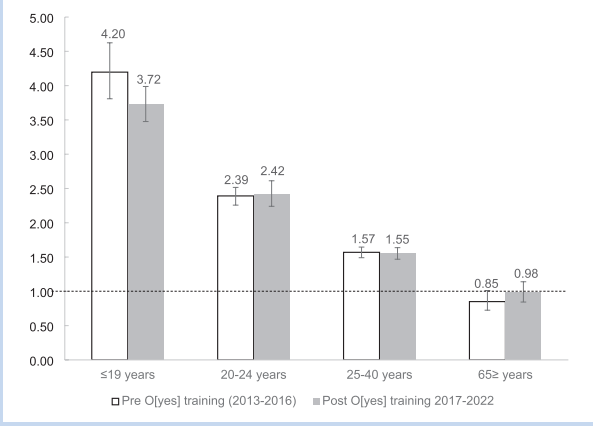

Figure 2. Relative risk of injury by age group (reference group 40–65 years) during the first month of tenure in Oregon before and after the O[yes] safety awareness training

Risk of Injury During the First Month of Tenure by Occupation

Teen workers employed in high-claim occupations (those that accounted for 5% or more of claims, i.e., Transportation and Material Moving; Production; Food Preparation and Serving Related; Farming, Fishing, and Forestry; Office and Administrative Support) had a lower risk of injury during the first month of tenure after the O[yes] training was available (2017–2022) compared with the period before it was available (2013–2016; RR 0.76,

Table 2. Adjusted Risk of Injury During the First Month of Tenure for Teenage Workers (≤19 years) Before (2013–2016) and After (2017–2022) the Availability of the O[yes] Training for High-Claim Rate Occupations

	b[†]	*SE*[§]	95% CI	
Intercept	−2.33***	0.04	−2.41	−2.25
Teen worker [ref: >19 years)	1.18***	0.05	1.08	1.28
High-claim rate occupations	0.30***	0.03	0.24	0.37
2017–2022 [ref: 2013–2016]	0.08	0.03	0.03	0.14
Teen × (2017–2022) × High-claim rate	−0.27***	0.06	−0.39	−0.15
Teen × (2013–2016) × High-claim rate	0.06	0.05	−0.04	0.16

Note. Models used Poisson regression with a log link. Coefficients shown are exponentiated and represent rate ratios (RR).
[†]General linear model with a Poisson distribution showing the log of the expected count of the outcome. Model adjusted for sex and insurer.
[§]Standard errors accounted for the clustering of claims in each of the 36 Oregon counties.
*$p < .05$. **$p < .0001$. ***$p < .0001$).

95% CI [0.67, 0.86], $p < .0001$). These results were adjusted for insurance type and sex (Table 2).

Discussion

Examining first-month injuries over a 10-year span provides valuable insight into patterns among teen workers in Oregon. These results build on prior regional studies (Yang et al., 2020, 2021), adding evidence from both before and after the introduction of a voluntary, web-based safety training program designed specifically for teens. Findings were mixed: while the relative injury rate for teen workers compared to older claimants did not change post-training, the overall share of first-month injuries among teens declined following the launch of the O[yes] program. Notably, no similar change was observed among other age groups.

Although only a fraction of Oregon's estimated teen workforce completed the O[yes] training during the study period, this study offers new insight by documenting decade-long trends in teen injury claims and highlighting persistent early-employment risks. While the program's direct impact on injury risk cannot be assessed here, the findings underscore the ongoing need for targeted prevention and improved access to effective safety training for young workers.

Despite fewer job opportunities during the pandemic, the share of first-month injuries among teen workers remained consistent with pre-pandemic levels in 2018 and 2019 (Guerin, Reichard et al., 2020). This suggests that those who did work faced similar risks, especially during the initial weeks on the job while adjusting to new environments and tasks. The persistence of these injury rates highlights the importance of safety measures tailored to teens and the potential benefits of accessible programs like O[yes] to protect young workers. Although the number of young workers rose again by 2022, this estimate does not reflect other pandemic-related changes, such as shifts to remote work (National Institute for Occupational Safety and Health (NIOSH), 2024).

Over the study period, the number of first-month injury claims among female teenage workers increased notably. While the causes are unclear from available data, several plausible explanations exist. National studies show shifting youth labor trends, with more young women in service, retail, and healthcare support roles—sectors linked to fast-paced work, intense customer interaction, and ergonomic strain (Runyan et al., 2007; Salminen, 2004). These conditions may increase the risk of injury early in employment, especially when adequate training or supervision is lacking. Gender differences in reporting, task assignment, and risk perception may also play a role. Further research is needed to explore these factors and support gender-responsive safety strategies for young workers.

The reduction in first-month injury risk was especially marked in high-claim rate occupations (those accounting for at least 5% of claims), where teen workers saw even lower injury rates post-2018, suggesting the O[yes] training may have been particularly effective in hazardous environments. While further causal research is needed to assess the effectiveness and reach of the training, these findings support tentative explanations linking lower claim rates to the period following the online training launch. One possible mechanism is greater hazard awareness and mitigation. As teen workers gained attention from regulators and insurers, employers may have improved onboarding practices due to heightened scrutiny. Additionally, since O[yes] includes community outreach beyond online modules, its growing presence in the state may have contributed. Future evaluations should link training participation with employment and injury data to assess the impact better.

These findings have important implications for workplace safety, especially for young and inexperienced workers (Dong et al., 2004; Linker et al., 2005; Teran et al., 2008). The significantly higher injury risk during teens' first month of employment underscores their vulnerability and the need for early, targeted safety training (Zierold, 2015). This study also reinforces the value of evaluating onboarding practices (Schulte et al., 2005). Effective onboarding should include thorough instruction on safety, equipment use, and task-specific risks (Guerin et al., 2019). Curricula designed for teens, especially when integrated into school programs, have been shown to reduce the risk of injury (Banco et al., 1997; Linker et al., 2005; Miara et al., 2013). Understanding the circumstances behind injury claims can inform strategies tailored to different demographic groups. Identifying when new employees are most vulnerable allows employers to implement targeted measures such as enhanced training, mentorship, and gradual onboarding to lower injury rates.

Limitations

First, analyses relied solely on a secondary dataset of workers' compensation claims, which lacked key variables. Without a unique identifier, we could not restrict to the first claim per individual, meaning some workers may appear multiple times, slightly inflating first-month claim counts and potentially misclassifying age categories. Rate assumptions, based on available data, should be viewed as approximations. Additionally, the lack of comparable first-month employment data for other age groups prevents direct comparisons. More granular tenure-specific data would help refine these estimates. The dataset also lacked information on claimant race/ethnicity and details such as shift type, which limited insights into risk factors and possibly introduced unmeasured confounding.

Second, although missing data were handled via complete case analysis, this method may introduce bias if data were not missing at random. Despite the large sample, excluding incomplete cases could affect generalizability, especially if excluded cases differed meaningfully from those retained.

Third, the O[yes] training program evaluation was limited by the dataset's inability to indicate which workers completed the training. As a result, we could only compare injury rates before and after its implementation, not between trained and untrained individuals. The inclusion of 2017 in the post-intervention period may have led to misclassification, as training was rolling out that year. Without data on training timing relative to job start, attribution of injury trends to the program is limited. This descriptive study was not designed to establish causal effects. Future research should include a comparison group, such as adult workers with similar tenure, and apply quasi-experimental methods, like segmented regression, to assess changes over time.

Research and Practice Implications

Understanding the factors behind the elevated risk of occupational injuries during the first month of tenure is essential for effective prevention. While countries like Canada offer high school-level safety training as electives (Tucker & Turner, 2013), such programs are less common in the U.S., including Oregon. This study emphasizes the importance of expanding youth access to safety training, including through school curricula. Regular evaluations of onboarding programs can reveal gaps that leave young workers vulnerable. Tailored training that aligns with teen learning styles and developmental stages can improve retention of critical safety information. Findings on the O[yes] program's impact on injury risk should be seen as suggestive, not conclusive. These limitations emphasize the need for future research using more detailed datasets and direct measures of training participation to better understand injury risk factors and the effectiveness of interventions like O[yes].

Conclusion

This study contributes to understanding youth occupational injury by documenting a decade-long pattern of elevated risk during the first month of employment. It also describes rising claim rates among female teen workers and a concentration of injuries in specific job categories. These findings underscore the need for targeted prevention strategies and enhanced data collection to support the evaluation of youth-focused safety interventions. The results highlight the importance of developing and evaluating programs like O[yes]. Employers, policymakers, regulators, and educators should prioritize and expand access to such training, especially for young workers entering high-risk jobs, to promote safer workplaces and reduce early-career injuries. While employers are primarily responsible for training, high school programs can play a key role in preparing students for current and future work.

Acknowledgments:

We want to thank Charles Easterly, Dede Montgomery, Laurel Kincl, and the Oregon Young Employee Safety Coalition (O[yes]). We would also like to thank Ed Vawter from the Oregon Division of Consumer and Business Services (DCBS).

Author Contributions

DAH conceived the study, analyzed the data, and led manuscript writing. RM contributed to data interpretation and analyses and writing sections of the manuscript. JB assisted with IRB protocols, data user agreements, and manuscript editing.

Conflict of Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this

article: This work was supported by the Oregon Fatality Assessment and Control Program (OR-FACE), a part of the Oregon Occupational Public Health Program, a cooperative agreement funded by the National Institute for Safety and Health (NIOSH) (Grant award 21U60OH012411). This work was also partly supported by the Oregon Institute of Occupational Health Sciences at Oregon Health & Science University via funds from the Division of Consumer and Business Services of the State of Oregon (ORS 656.630).

Ethical Considerations

This study was approved by the Institutional Review Board at Oregon Health & Science University.

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References

Banco, L., Lapidus, G., Monopoli, J., & Zavoski, R. (1997). The Safe Teen Work Project: A study to reduce cutting injuries among young and inexperienced workers. *American Journal of Industrial Medicine*, *31*(5), 619–622. https://doi.org/10.1002/(sici)1097-0274(199705)31:5<619::aid-ajim17>3.0.co;2-1

Breslin, F. C., Polzer, J., MacEachen, E., Morrongiello, B., & Shannon, H. (2007). Workplace injury or "part of the job"? Towards a gendered understanding of injuries and complaints among young workers. *Social Science & Medicine*, *64*(4), 782–793.

Breslin, F. C., & Smith, P. (2005). Age-related differences in work injuries: A multivariate, population-based study. *American Journal of Industrial Medicine*, *48*(1), 50–56. https://doi.org/10.1002/ajim.20185

Breslin, F. C., & Smith, P. (2006). Trial by fire: A multivariate examination of the relation between job tenure and work injuries. *Occupational and Environmental Medicine*, *63*(1), 27–32. https://doi.org/10.1136/oem.2005.021006

Chin, P., DeLuca, C., Poth, C., Chadwick, I., Hutchinson, N., & Munby, H. (2010). Enabling youth to advocate for workplace safety. *Safety Science*, *48*(5), 570–579.

Dong, X., Entzel, P., Men, Y., Chowdhury, R., & Schneider, S. (2004). Effects of safety and health training on work-related injury among construction laborers. *Journal of Occupational and Environmental Medicine*, *46*(12), 1222–1228. https://www.ncbi.nlm.nih.gov/pubmed/15591974

Eisen, E. A., & Robins, J. M. (2001). Healthy worker effect. In *Encyclopedia of environmetrics*. John Wiley & Sons. https://doi.org/10.1002/9780470057339.vah007

Guerin, R. J., Okun, A. H., Barile, J. P., Emshoff, J. G., Ediger, M. D., Baker, D. S. (2019). Preparing teens to stay safe and healthy on the job: A multilevel evaluation of the Talking Safety curriculum for middle schools and high schools. *Prevention Science*, *20*(4), 510–520. https://doi.org/10.1007/s11121-019-01008-2

Guerin, R. J., Okun, A. H., Stephenson, C. M., Bush, D., Dewey, R., Szudy, B., & Cincinnati, M. C. (2020). *Youth@Work - Talking safety: A safety & health curriculum for young workers, Oregon edition*. Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2015–153.

Guerin, R. J., Reichard, A. A., Derk, S., Hendricks, K. J., Menger-Ogle, L. M., & Okun, A. H. (2020). Nonfatal occupational injuries to younger workers - United States, 2012-2018. *MMWR Morbidity and Mortality Weekly Report*, *69*(35), 1204–1209. https://doi.org/10.15585/mmwr.mm6935a3

Huizinga, N. C., Davis, J. A., Gerr, F., & Fethke, N. B. (2019). Association between occupational injury and subsequent employment termination among newly hired manufacturing workers. *International Journal of Environmental Research and Public Health*, *16*(3), Article 433. https://doi.org/10.3390/ijerph16030433

Inanc, H. (2021). *Youth unemployment in the first year of the COVID-19 pandemic*. Mathematica Policy Research.

Jennifer, S., Purewal, B. P., Macpherson, A., & Pike, I. (2018). Metrics to assess injury prevention programs for young workers in high-risk occupations: A scoping review of the literature. *Health Promotion and Chronic Disease Prevention in Canada: Research, Policy and Practice*, *38*(5), 191–199. https://doi.org/10.24095/hpcdp.38.5.01

Linker, D., Miller, M. E., Freeman, K. S., & Burbacher, T. (2005). Health and safety awareness for working teens: Developing a successful, statewide program for educating teen workers. *Family & Community Health*, *28*(3), 225–238. https://doi.org/10.1097/00003727-200507000-00004

Miara, C., Gallagher, S., Bush, D., & Dewey, R. (2013). Developing an effective tool for teaching teens about workplace safety. *American Journal of Health Education*, *34*(sup5), S-30–S-34. https://doi.org/10.1080/19325037.2003.10603590

Miller, M. E., & Salazar, M. K. (2004). Young adolescents in the work force—A population at risk. *AAOHN Journal*, *52*(11), 461–464.

National Institute for Occupational Safety and Health (NIOSH). (2024). *Young worker employment, injuries and illnesses charts*. https://www.cdc.gov/niosh/young-workers/charts/index.html

Oregon Occupational Safety and Health Administration. (2017). *Young Employee Safety Awareness online training*. Retrieved October 10, 2024, from https://osha.oregon.gov/edu/grants/train/pages/oyes-online-training.aspx

Oregon Young Employee Safety Coalition. (2024). *About us*. Retrieved June 30, 2025, from https://youngemployeesafety.org/about/

Rubenstein, H., Sternbach, M. R., & Pollack, S. H. (1999). Protecting the health and safety of working teenagers. *American Family Physician*, *60*(2), 575–580.

Runyan, C. W., Bowling, J. M., Schulman, M., & Gallagher, S. S. (2005). Potential for violence against teenage retail workers in the United States. *Journal of Adolescent Health*, *36*(3), 267.e261–e265. https://doi.org/10.1016/j.jadohealth.2004.07.006

Runyan, C. W., Schulman, M., Dal Santo, J., Bowling, J. M., Agans, R., & Ta, M. (2007). Work-related hazards and workplace safety of US adolescents employed in the retail and service sectors. *Pediatrics*, *119*(3), 526–534. https://doi.org/10.1542/peds.2006-2009

Runyan, C. W., Vladutiu, C. J., Rauscher, K. J., & Schulman, M. (2008). Teen workers' exposures to occupational hazards and use of personal protective equipment. *American Journal of Industrial Medicine*, *51*(10), 735–740. https://doi.org/10.1002/ajim.20624

Runyan, C. W., & Zakocs, R. C. (2000). Epidemiology and prevention of injuries among adolescent workers in the United States. *Annual Review of Public Health*, *21*, 247–269. https://doi.org/10.1146/annurev.publhealth.21.1.247

Salminen, S. (2004). Have young workers more injuries than older ones? An international literature review. *Journal of Safety Research*, *35*(5), 513–521. https://doi.org/10.1016/j.jsr.2004.08.005

SAS Institute. (2023). *SAS In* (Version 9.4).

Schulte, P. A., Stephenson, C. M., Okun, A. H., Palassis, J., & Biddle, E. (2005). Integrating occupational safety and health information into vocational and technical education and other workforce preparation programs. *American Journal of Public Health*, *95*(3), 404–411. https://doi.org/10.2105/AJPH.2004.047241

Smith, P. M., & Mustard, C. A. (2007). How many employees receive safety training during their first year of a new job? *Injury Prevention*, *13*(1), 37–41. https://doi.org/10.1136/ip.2006.013839

Teran, S., Strochlic, R., Bush, D., Baker, R., & Meyers, J. (2008). Reaching teen farm workers with health and safety information: An evaluation of a high school ESL curriculum. *Journal of Agricultural Safety and Health*, *14*(2), 147–162. https://doi.org/10.13031/2013.24348

Tucker, S., & Turner, N. (2013). Waiting for safety: Responses by young Canadian workers to unsafe work. *Journal of Safety Research*, *45*, 103–110. https://doi.org/10.1016/j.jsr.2013.01.006

U.S. Bureau of Labor Statistics. (2024). *Table 1. Median years of tenure with current employer for employed wage and salary workers by age and sex, selected years, 2014-2024*. Retrieved January 16, 2025, from https://www.bls.gov/news.release/tenure.t01.htm?utm_source=chatgpt.com

Ward, J. A., de Castro, A. B., Tsai, J. H., Linker, D., Hildahl, L., & Miller, M. E. (2010). An injury prevention strategy for teen restaurant workers. Washington State's ProSafety project. *AAOHN Journal*, *58*(2), 57–65; quiz 65–57. https://doi.org/10.3928/08910162-20100127-01

Washington State Fatality Assessment and Control Evaluation (FACE) Program. (2024). *Teen worker loses legs to trencher* (Fatality Narratives, Issue). WA State Department of Labor & Industries. https://www.lni.wa.gov/safety-health/safety-research/files/2024/71_256_2024_TeenTrenchingAmputation.pdf

Yang, L., Branscum, A., Bovbjerg, V., Cude, C., Weston, C., & Kincl, L. (2021). Assessing disabling and non-disabling injuries and illnesses using accepted workers compensation claims data to prioritize industries of high risk for Oregon young workers. *Journal of Safety Research*, *77*, 241–254. https://doi.org/10.1016/j.jsr.2021.03.007

Yang, L., Branscum, A., Smit, E., Dreher, D., Howard, K., & Kincl, L. (2020). Work-related injuries and illnesses and their association with hour of work: Analysis of the Oregon construction industry in the US using workers' compensation accepted disabling claims, 2007-2013. *Journal Occupational Health*, *62*(1), e12118. https://doi.org/10.1002/1348-9585.12118

Zierold, K. M. (2015). Teen worker safety training: Methods used, lessons taught, and time spent. *New Solutions*, *25*(1), 25–41. https://doi.org/10.1177/1048291115569024

Zierold, K. M., & Anderson, H. A. (2006). Severe injury and the need for improved safety training among working teens. *American Journal of Health Behavior*, *30*(5), 525–532. https://doi.org/10.5555/ajhb.2006.30.5.525

Zierold, K. M., & McGeeney, T. J. (2016). Communication breakdown: How working teens' perceptions of their supervisors impact safety and injury. *Work*, *54*(1), 3–9. https://doi.org/10.3233/WOR-162290