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The Role of Worker Age in Ohio Workers' Compensation Claims in the Landscaping Services Industry

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Abstract

Objective—This study employed analysis of workers' compensation (WC) claims in the landscaping services industry to identify occupational factors associated with claims from workers of different ages.

Methods—Private sector claims for 2005–2017 to the Ohio Bureau of Workers' Compensation (OHBWC) and their free-text descriptions were used along with data from the U.S. Census Bureau American Community Survey to examine rates and types of WC claims by worker age.

Results—Although the claim rate for younger workers was higher than for older workers overall (593 vs. 261 per 10,000 full-time equivalent employees, $p<0.001$), claims from older workers had higher nonzero median cost ($1002 vs. $522, $p<0.001$).

Conclusion—Analysis of WC claim rates shows significant differences between claims in different age groups. These differences can be used to target safety interventions for the greatest impact.

Keywords

Aging workforce; landscaping; groundskeeping; arborist; workers' compensation; injury; young workers

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Ethical considerations: This study was internally reviewed by NIOSH, and it was determined that it did not constitute human subjects research. Rather, the study involved the analysis of coded and previously collected WC administrative claims data.

Introduction

In the landscaping services industry, workers experience higher rates of both fatal and nonfatal injuries than the average in all private industry.[1] Many landscaping services industry tasks are physically demanding, involving lifting and carrying heavy loads. The work is performed almost exclusively outdoors, using a variety of outdoor power equipment that can present a multitude of hazards to workers.[2,3] The median age for workers in the landscaping services industry, North American Industry Classification System (NAICS) code 56173, has risen from 38.1 to 40.9 from 2011 to 2019, while the median age for all employed people in the United States has stayed constant at approximately 42.[4] As the landscaping services workforce ages, their risk and cause of occupational injury, illness, or death changes.[5,6] The U.S. Bureau of Labor Statistics (BLS) reports that, in 2019, workers aged 55 and over accounted for 38 percent of all workplace fatalities, up from 20 percent in 1992.[7]

In 2019, the U.S. Census Bureau listed over 108,000 landscaping services firms, with a total payroll of more than 700,000 workers.[8] BLS lists almost 72% of landscaping services industry workers as having the occupation of grounds maintenance worker, Standard Occupational Classification (SOC) code 37–3010.[9] Despite continuing improvements in occupational health and safety, the occupation of grounds maintenance worker had 229 fatal injuries in 2019, the highest number since 2003, when BLS began to report data for this occupation.[7]

Many older workers have desirable traits including experience, wisdom, strategic thinking, loyalty, and reliability.[10] However, other abilities are recognized to decline at older ages. These abilities may include physical strength, endurance, flexibility, hearing, vision, balance, memory, and reaction time.[5,6] Although older workers have lower rates of injury than younger workers, when injuries do occur, they are more likely to be serious, costly, and result in more time away from work.[11–16]

Prior research

In our earlier study, landscaping services industry claims to the Ohio Bureau of Workers' Compensation (OHBWC) from 2001 – 2017 were examined to characterize the incidents leading to claims in this industry.[3] Unlike the system used by BLS, the OHBWC defines workers' compensation (WC) claims as medical-only (MO) or lost-time (LT). "Days away from work" (DAFW) cases, as defined by the BLS, are those requiring at least one day away from work, whether or not job transfer or restriction is concerned.[1] Claims with only medical treatment expenses and those claims with less than eight days away from work are classified as MO by the OHBWC. LT claims are more serious, involving more than seven days away from work.

The previous study found that the highest number of LT claims in this industry were for workers in the 25–35-year-old age group. However, workers filing LT claims (mean age 35.9 years old) tended to be older than workers filing MO claims (mean age 31.8 years old). For landscaping services industry workers filing MO claims to the OHBWC, the mean age

increased from 30 to 35 years old from 2001–2017, and the mean age of those filing LT claims increased from 34 to 38 years old over the same period.

The purpose of the current study is to describe MO and LT claims from the landscaping services industry in the OHBWC database from 2005–2017 to help illustrate the differences in claims from the state of Ohio in the landscaping services industry with age and the varying causes of those claims. The emphasis is to identify occupational factors putting workers at increased risk at different ages. Strategies that may help to reduce incidents causing injuries and illnesses are proposed.

Methods

Data source

All public and private employers in the state of Ohio are insured by the OHBWC, except for sole proprietorships, partnerships, and companies with 500 or more employees. Excluded employers can also opt to be insured by the OHBWC. Of all Ohio workers, two-thirds are insured by the OHBWC, along with 99% of Ohio businesses.[17] Claims to the OHBWC are a valuable source of data on incidents causing occupational injuries and illnesses. The OHBWC database includes information on injured worker demographics not including race or ethnicity, and in some cases, job tenure. The NIOSH Center for Workers' Compensation Studies (CWCS) partners with providers of WC insurance in several states to improve workplace safety and health.[18]

To calculate rates of injury and illness, the annual number of full-time equivalent (FTE) employees insured by OHBWC was estimated in this industry, using the methods described in previous studies.[3,17] Data from the U.S. Census Bureau American Community Survey (ACS) contains information on the number of hours worked per worker each year, making it possible to convert employees to FTEs.[19] ACS data for census group 7770, landscaping services, also provided worker age for the Ohio landscaping services worker population, so that age-specific rates could be calculated. Total claim counts were divided by the total estimated FTEs for 2005–2017 to determine cumulative claim rates. Our previous published study provides a more complete description of methods.[3]

Costs

A factor-adjusted valuation method is used by the OHBWC to estimate ultimate claim costs for claims that are not fully paid-out.[20] For each claim, factor-adjusted costs for medical payments and indemnity (partial wage replacement) were determined. A full description of cost calculation is found in our previous study.[3] There was zero cost to the OHBWC for some of the claims in this database. This may occur due to OHBWC programs that allow employers to pay medical costs up to $15k and indemnity directly. In addition, some zero cost claims may occur if no medical treatment beyond first aid or indemnity is involved.[17,20]

Study population

In this study, accepted claims from OHBWC-insured, private-sector landscaping services industry employees (NAICS code 56173) were examined. Only those injuries and illnesses

that occurred from 2005 – 2017 for which employee counts were available were included. Public employees have been excluded from this study because they are identified by general NAICS codes for public employees, making the identification of landscaping services workers difficult. For multiple-location private-industry employers, different locations may correspond to different industries, so the 3-digit or 5-digit NAICS code corresponding to the majority of employees was assigned to the entire company. The method used has been described more fully in a prior study.[17]

Claims accepted by the OHBWC must be filed completely and be proven to be work-related. From 2005 to 2017, claimants had 2 years from the date of injury to file a claim.[22] Claims filed between 2011 and 2018 were accepted by the OHBWC at a rate of 88 – 90%.[21]

De-identified and previously collected WC claims were examined in this study. The NIOSH Institutional Review Board reviewed the study and determined that it did not constitute human subjects research.

Data coding and processing

OHBWC and NIOSH developed 57 broad diagnosis categories to group ICD-9-CM diagnosis codes.[23] The ICD-9-CM code that would most restrict a worker's return to work was chosen as the optimal return to work (RTW) code for claims with multiple diagnoses.[24] Claims diagnoses transitioned from ICD-9-CM to ICD-10-CM system in 2015. For 2015–2017 claims, OHBWC mapped the ICD-10-CM codes to ICD-9-CM and then selected a RTW code based on the ICD-9-CM codes.

A machine learning algorithm developed by Bertke et al.[25] was used to code the event or exposure (cause of an injury or illness) for each OHBWC claim according to the 2-digit event/exposure categories in the BLS Occupational Injury and Illness Classification System (OIICS version 2.01). [26] The free-text incident description and the RTW code were used by the algorithm to determine the OIICS code. Over 99% of claim descriptions were sufficient to determine an event or exposure. For each claim, the algorithm estimates probabilities for each of the cause categories and selects the category with the maximum probability as the event/exposure. For this analysis, only the 8 broad, 1-digit event or exposure categories were studied.

To improve coding accuracy, LT claims with low probabilities (i.e., bottom quartile) associated with the selected event or exposure category or with costs above the 95th percentile were manually reviewed. For NAICS 56173, this included 649 LT claims for 2007 – 2017. Personnel limitations and the unavailability of certain data prevented manually reviewing claims for 2005 and 2006. Among those manually reviewed, 1-digit OIICS codes for 483 of 649 (74%) were found to be accurate. Assuming 100% accuracy for manually-coded events and exposures, the estimated accuracy was adjusted, for a final 1- digit OIICS code accuracy of 80%.

Four ten-year-range age groups were created for workers aged 25– 64. Two additional age groups covered those older and younger than those ages, resulting in a total of 6 age groups. Traditional statistical analysis is not applicable to population rather than sample data, but

we performed statistical analyses to highlight specific differences among age categories, claim types (MO or LT), and events/exposures or diagnosis categories. Two 3-way analyses-of-variance (ANOVAs) by age, claim type, and event/exposure or diagnosis category were performed to determine how claim rates (claim counts divided by FTE estimates) for (1) event/exposure or (2) diagnosis category differed between age groups and claim types. SAS® Version 9.4 (SAS, Cary, NC) with a significance level of 0.05 was used for the analysis. For statistical analysis, the 57 diagnosis categories were reduced to a set of the 16 diagnoses for which there were more than 150 claims each, plus a category of "Other," which combined the 41 diagnosis categories having 150 or fewer claims.

Free-text descriptions of incidents

As in the previous study,[3] the short free-text descriptions of claims incidents were helpful in identifying common circumstances leading to occupational injury or illness. A variety of keywords relating to injuries and illnesses in this industry were used to search the free-text descriptions. These keywords included parts of the body, work tasks, hazards, and landscaping tools and equipment. Words and groups of words used in searching the free-text descriptions are listed in Tables S1–S3.

Results

Total landscaping services claims to OHBWC from 2005–2017 numbered 11,683. Of these, 70 claims could not be matched to a number of FTEs for the employer and were excluded, and 11 claims did not include the age of the injured worker and were excluded. The remaining 11,602 claims (99.3%), 9,401 of which were classified as MO and 2,201 classified as LT, were analyzed by the age of the worker. The number of workers in the landscaping services industry in Ohio in each age group, by year, as estimated from ACS data, is shown in Figure 1. While employment in the age groups 44 years old and younger remained essentially stable (14,755 in 2005 to 15,258 in 2017), estimated employment of those 45–54 years old doubled from 2005 to 2017 (1,956 to 4,055); employment of those 55–64 years old nearly tripled (1,066 to 3,029); and employment of those 65 and older quadrupled (156 to 619).

Thirty percent of the claims (3,534 claims from 1,466 workers) in this dataset are from workers injured more than once during the time period studied. Of the total of 9,545 workers who filed claims, 418 (4.3%) had claims in more than one age range.

Event or exposure

Table 1 gives MO and LT claim rates for each event or exposure and for all events or exposures by age category. Differences among claim rates in different age categories are apparent. Overall (MO plus LT) claim rates decrease steadily with increasing age (from 592.6 per 10,000 FTE for workers younger than 25 to 261.1 for workers aged 65 and older, $p>0.001$). MO claim rates for all events combined also decrease steadily with increasing age (from 522.5 per 10,000 FTE for workers younger than 25 to 209.5 for workers aged 65 and older, $p<0.001$). The rate of MO "Contact with objects and equipment" for workers less than 25 years of age, in particular, is over 3.5 times the rate for workers aged 65 and older.

The majority of these claims for those less than 25 years of age are for “Open wounds” (802 of 1,542 claims). The rate of all LT claims reaches a maximum in the 45– 54-year-old age group, declining at higher ages.

ANOVA results indicated that MO claim rates generally decreased with age for injuries due to “Violence and other injuries by persons or animals,” “Exposure to harmful substances or environments,” and “Contact with objects and equipment.” There is a significant interaction between claim type (MO or LT) and age group ($p<0.001$) and between event or exposure and age group ($p<0.001$). (See Table S4 in the Supplemental Materials.) For “Overexertion and bodily reaction” injuries, the decline with age in MO injuries is offset by an increase with age up to age 45–54 in LT injuries. MO claim rates for “Falls, slips, trips” were higher for the youngest workers (< 25 years old), declined between 25 and 44, and then rose, while LT claim rates for “Falls, slips, trips” increased steadily with age. The differences in claim rates for “Falls, slips, trips” with age group for LT claims were statistically significant ($p=0.010$), but not for MO claims ($p=0.127$).

Workers aged 45 – 54 show the highest rate of LT claims from “Transportation Incidents,” “Contact with objects and equipment,” and “Overexertion and bodily reaction.” (See Table 1.) The two oldest age groups show the highest LT rates of “Falls, slips, trips;” they show the lowest MO and LT rates of “Contact with objects and equipment.”

Injury or illness diagnoses category

Rates of some of the most frequent MO and LT injury types are given by age group in Table 2. ANOVA results indicated that the rates of MO “Open wounds” decreased with age, as did the MO rates for “Contusion,” “Sprains-lower extremity,” “Sprains-back,” and “Fracture-upper extremity.” (See Table S5 in the Supplemental Materials for the ANOVA table.) The MO rate of “Open wounds” for workers younger than 25 was over 3.5 times the rate for workers aged 65 and older. For “Soft tissue/Enthesopathy,” “Fracture-lower extremity,” “Dislocation,” and “Fracture-neck and trunk,” MO claim rates increased with age. LT claim rates for “Sprains-upper extremity,” “Dislocation,” and “Fracture-neck and trunk” also increased with age. LT “Sprains-back” claim rates were insignificantly higher in the two age ranges spanning 25– 44 and lower in other age categories ($p=0.089$).

Free-text descriptions of incidents

A count of the frequency of relevant words in the free text description of claims also showed differences between workers of different ages (See Table 3.). The words “fell” or “fall” and the word “slip” were found most frequently for workers aged 55 and older for both MO and LT claims. The words “shoulder,” “elbow,” “wrist,” or “arm” were found most frequently for workers aged 55 and older for MO claims and occurred most frequently in the two age groups spanning 45– 64 years for LT claims. The occurrence of the words “head,” “neck,” “eye,” “face,” “nose,” “ear,” “chin,” and “cheek” was highest for the two oldest age groups for LT claims.

The words “hand,” “finger,” “thumb,” and “pinky” occurred least frequently for the 55– 64 age group for both types of claims, and most frequently in the youngest age group. This group of words were the most frequently found in MO claims for “Contact with objects and

equipment" in workers younger than 25 (628 of 1,542 claims). The word "cut" appeared most frequently in claims from the youngest age groups for both MO and LT claims. The word "cut" appeared 470 times in the 1,542 MO claims for "Contact with objects and equipment" for workers under 25 years of age. The decline in the appearance of the word "cut" in LT claims with increasing age was statistically significant ($p<0.001$), as was the decline with age up to age 65 in the appearance of the word "mow" in MO claims ($p<0.001$).

Cost of claims

The total cost of all claims studied was nearly $168 million, including 1,050 claims (9.1%) that were zero cost to OHBWC. LT claims made up 94% of the cost of all claims, although LT claims were only 19% of the total number of claims. For each age group, Figure 2 shows the percent of the workforce in that age group, the percent of claims, and the percent of the total cost of claims. Although the workers in the two youngest age groups are injured relatively more frequently than older workers, their claims are a lower fraction of the total cost than might be expected. Workers of age 45–54 years make up only 15.7% of the workforce, but they account for 25.0% of the total cost of claims.

Median nonzero MO and LT costs of claims are given by age category in Table 4. Overall (MO plus LT) nonzero median costs rise steadily with increasing age (from $522 for workers younger than 25 to $1,002 for workers aged 65 and older, $p<0.001$). Nonzero median MO costs also rose steadily with increasing age (from $454 for workers younger than 25 to $769 for workers aged 65 and older, $p<0.001$). The MO nonzero median cost observed for the oldest age group was approximately 70% higher than the cost of a MO claim from a worker younger than 25 years of age. The highest LT nonzero median costs were observed for the two age groups spanning 45– 64 years old. These costs were approximately 2.5 times the nonzero median cost for an LT claim from a worker younger than 25 years of age.

When the 100 most costly claims from the landscaping services industry to the OHBWC for 2005– 2015 were examined, nine of the claims and 6% of the cost were found to be from a worker aged 55 or older; none of these claims were for a worker aged 65 or older (Table 5). For comparison, workers aged 55 and older were estimated to make up 7.9% of landscaping services industry workers in Ohio in the years studied. The types of claims that were most expensive varied between older and younger workers (See Table 5). Forty of the 100 most expensive claims for older workers (the two age ranges covering ages 55 and older) were a result of "Falls, slips, trips," compared to 24 for those aged 54 and younger. For those in the four age ranges aged 54 and younger, the most frequent event or exposure for the 100 most expensive claims was "Contact with objects and equipment," found 38 times, compared to 23 for workers 55 and older.

Twenty-seven of the 100 most expensive claims for workers aged 55 and up were due to "Overexertion and bodily reaction" (Table 5), compared to 17 of the 100 most expensive claims for those 54 and younger. The free text of these claims for the oldest workers revealed that eight of the 27 claims occurred when pushing or lifting heavy objects and equipment and six of the 27 claims occurred during loading and unloading of trailers and

work vehicles. Other overexertion claims involved maintenance of equipment, digging, tree planting or climbing, repetitive motion, and pull-starting.

The most common diagnosis categories resulting in the 100 most expensive claims for those age 55 and older were “Sprains-upper extremity” (17 claims) and “Fracture-upper extremity” (11 claims), compared to one claim and four claims, respectively, for those aged 54 and younger. Fourteen of those twenty- eight claims were the result of “Falls, slips, trips.” Nine of the 100 most costly claims from workers 55 and older were “Dislocation” injuries, compared to three for those aged 54 and younger (Table 5). Eight of those nine “Dislocation” injuries were the result of “Falls, slips, trips.”

“Disc disorders” comprised 23 of the 100 most expensive claims for workers aged 54 and younger, compared to five for those age 55 and older (See Table 5). Fourteen of the twenty-three were due to “Overexertion and bodily reaction.”

The words “tree,” “branch,” “wood,” “limb,” or “log” were found in 35 of the 100 most expensive claims for landscaping services workers aged 54 and younger, but only 18 of similar claims for those 55 and older. For landscaping services workers aged 55 and older, the most frequently-occurring words in the 100 most expensive claims were “fell” and “fall,” found in 37 of the 100 most expensive claims, compared to 23 for those age 54 and younger.

Claims for fatalities

Information on fatalities in the OHBWC database is limited, but there were 14 fatality claims in the database for the landscaping services industry in Ohio during the study period. Seven occurred during tree work, and three were the result of motor vehicle accidents. Most fatalities occurred in the three age groups spanning 25 – 54 years of age; only one was in a worker over 55 years of age, and it occurred during tree work. It was the most costly claim for a worker aged 55 and older.

Discussion

Comparison to events or exposures in other industries

In the landscaping services industry, as in some other industries,[15,27] workers in the two age groups spanning 45– 64 have the highest nonzero median cost for LT injuries (Table 4). However, the rate of LT injuries peaks in the age group, 45–54 years, and decreases in workers older than 54 or younger than 45 (Table 1). Workers 45–54 years of age have the highest rates of LT claims due to “Transportation incidents,” “Contact with objects and equipment,” and “Overexertion and bodily reaction.” (Table 1) These high rates of LT claims may be the reason why the total cost of claims for workers aged 45–54 in this study is disproportionately high compared to their representation in the workforce (Figure 2).

This same pattern of injury rate with age has been found in the construction industry for work-related musculoskeletal disorders (WMSDs)[15,28] and for overexertion injuries in all workers.[12] The reason for this is unclear, but may reflect changing job responsibilities for older workers, who move to jobs in which they are less likely to be injured. It could also

reflect the healthy worker effect, in which those who are less healthy and more likely to file a claim tend to leave the workforce at a younger age.[5,29]

Trends in claims for several events or exposures with age found in this study are similar to those found in other research (Table 1), with rates of "Falls, slips, trips" increasing with age, rates of "Contact with objects and equipment" decreasing with age, and rates of "Overexertion and bodily reaction" showing the lowest rates for both the youngest and the oldest workers.[12,16,28]

Falls, slips, trips

Older workers in the landscaping services industry suffer injuries from "Falls, slips, trips" at higher frequency than younger workers. The high rate of "Falls, slips, trips" may be caused in part by decreased balance associated with aging.[30] In the two oldest age groups, "Falls, slips, trips" were the most frequent event or exposure associated with the high rates of MO "Fracture-lower extremity" (11 of 17 claims), LT "Fracture-neck and trunk" (5 of 9 claims), MO and LT "Dislocations" (12 of 19 claims), and LT "Sprains- upper extremity" (14 of 25 claims).

Falls were primarily responsible for the high frequency of occurrence of the words "head," "neck," "eye," "face," "nose," "ear," "chin," and "cheek" in the free-text description of LT claims for the two oldest age groups (9 of 21 claims). These falls typically resulted in striking the head against something while falling.

A close reading of the free-text descriptions of "Falls, slips, trips" claims that were found in the 100 most expensive claims for older workers (Table 5) revealed that many of these injuries occurred from falls, slips, or trips on stairs or on the same level (16 of 40 claims). Often mentioned as a factor were wet conditions, slopes, ice, uneven walking surfaces, and obstructions such as landscaping fabric rolls (used as weed barriers and for erosion control). When working at a remote site, a preliminary survey of the site before beginning work might help to identify tripping and falling hazards such as slopes, drop-offs, stumps, and holes in the ground.[31]

The next most commonly-noted factor in the 100 most expensive "Falls, slips, trips" claims for older workers was loading and unloading of trailers and work vehicles (10 of 40 claims). This was identified in our previous study as possibly being an underrated cause of injury in this industry.[3] Engineering controls such as improved truck, trailer, and ramp safety features, and better procedures and training for loading and unloading have been previously identified as potential interventions for reducing these claims.[3] Five of the forty falls were falls from ladders; only one of the falls was a fall from a tree. As noted in a study by Pollard et al., ascending and descending a ladder can be a hazardous task.[32] Descending typically leads to more falls and slips than ascending due to the lack of visibility of ladder rungs while descending backward.[32]

Research in the mining industry has shown that the walking surface heavily contributes to falls, slips, and trips.[32–34] As a predominantly outdoor occupation, landscapers may face weather conditions that leave the ground or other walking surfaces slippery with mud, water,

or ice.[32,34] Other walking surfaces, such as trailer beds, ladders, or steps may also cause falls, slips, and trips due to the incline or the type of material used for the walking surface.[33] In a study comparing the number of slips for three walking surfaces, most slips occurred on contaminated walking surfaces with an incline >10 degrees.[33] The material of ramps also impacted the number of slips. Fewer slips occurred on diamond weave grating compared to perforated or serrated bar grating; this was attributed to the higher measured coefficient of friction between the worker's shoes and the diamond weave grating.[33]

To reduce injuries from "Falls, slips, trips," especially among older workers, employers can take steps such as improving lighting, cleaning up spills, and controlling tripping hazards where possible.[5] Training supervisors and employees about age-related changes, their impact on types/causes of injuries, and good work practices can increase awareness and help to avoid injury.[5] Appropriate personal protective equipment (PPE), like non-slip footwear with reinforced toes, should be worn correctly to reduce injuries due to "Falls, slips, trips" when walking on slippery or sloped surfaces.[5]

Contact with objects and equipment

Older workers' rates of "Contact with objects and equipment" are significantly lower than those of younger workers. The relatively low rate of "Contact with objects and equipment" in older age groups may reflect older workers moving to jobs with less exposure to power tools and equipment, as well as their greater experience and skill in using power tools and equipment.[5,29] This may also account for the low occurrence of "Open wounds" injuries in this age group and the low occurrence of the word "cut" and the words "hand," "finger," "thumb," and "pinky" in the text of claims compared to the youngest workers. "Contact with objects and equipment" is often the event or exposure associated with "Open wounds," especially cuts to the hands and digits.[3]

In contrast, workers younger than age 25 showed the highest rate of MO "Contact with objects and equipment" (Table 1) and MO and LT "Open wounds" (Table 2). In the free text of MO "Contact with objects and equipment" claims from this age group, the most frequent word or group of words was "hand," "finger," "thumb," or "pinky", followed by "cut." This suggests that MO "Contact with objects and equipment" in this age group frequently results in cuts to the hand and digits. The free text of nineteen of the forty-five LT "Open wounds" injuries for workers under 25 years old also contained "cut". The free-text descriptions of 18 of the LT "Open wounds" injuries contained "hand," "finger," "thumb," or "pinky", and 18 contained "foot," "knee," "ankle," "leg," or "toe."

Thirty-eight of the 100 most expensive claims for workers younger than 55 were due to "Contact with objects and equipment;" five of these were for workers younger than 25. A close reading of the free text for the 38 claims shows that 18 occurred during tree work, many involving chain saws, and eight occurred when a hand or foot was caught in machinery such as a lawnmower or stump grinder.

In view of the high rates of injury to young and short-tenure workers, especially injuries due to "Contact with objects and equipment,"[3] there may be a need for better engineering controls in the form of improved safety features on outdoor power equipment. Young and

newly-hired workers need training, especially on the safe use of power tools. There may also be an opportunity in the landscaping services industry for older workers to mentor young and newly-hired workers, as has been done in nursing, mining, and other industries.[35–37]

Overexertion and bodily reaction

The rates of LT claims due to "Overexertion and bodily reaction" show a maximum for workers in a middle age group, 45–54 years, and decrease for older workers, as has been found in other industries.[12,15,28,38] This may also be due to the changing of job responsibilities in workers older than this age range or the healthy worker effect, and may be associated with the relatively low rates of LT "Sprains-back," "Sprains-lower extremity," and "Disc disorders" in the two highest age groups.[3]

As noted earlier, the 45–54-year-old age group accounts for a disproportionate share of the costs of claims (Figure 2). Of the 117 LT "Overexertion and bodily reaction" claims for this age group, 32 occurred while lifting something, 20 occurred during loading or unloading activities, and 12 occurred when a misstep happened while walking. The missteps typically happened when ground was uneven or when moving from one surface to a different one, as when stepping off a curb. Eight of the claims were due to repetitive motion. Diagnosis categories resulting from these "Overexertion and bodily reaction" claims included "Sprains-back" (n=24), "Sprains-upper extremity" (n=23), "Soft tissue/ Enthesopathy" (n=12), "Disc disorders" (n=11), "Sprains-lower extremity" (n=11), and "Hernia of abdominal cavity" (n=10).

Twenty-seven of the 100 most costly claims for workers 55 and older were due to "Overexertion and bodily reaction." The free text of eight of the 27 mentioned pushing or lifting and six described loading/unloading activities. The other claims were somewhat evenly divided among other strenuous activities including pulling, rolling, and digging. Seven of the diagnosis categories associated with these 27 claims were for "Sprains-upper extremity," and four each were for "Disc disorders" and "Soft tissue/Enthesopathy."

The use of engineering controls such as mechanized lifting assist equipment and improved safety features for loading and unloading of vehicles and trailers could help to reduce "Overexertion and bodily reaction" injuries.[3] Training that stresses good lifting techniques could also help to reduce LT claims for all ages, especially for those at highest risk.

Tree Work

Older workers are less frequently injured while performing tree work than younger workers (54 years old and younger). When keywords used in the 100 most costly claims for each of these age ranges were counted, the words "tree," "branch," "wood," "limb," or "log" were found twice as frequently in claims from younger workers as from older workers (Table 5). In view of the devastating injuries that can occur during tree work, this may account for some of the reduction in the most serious and costly claims among the older age groups.

In the 100 most costly claims for workers aged 54 and younger, 35 claims were for tree work. According to the free text of these claims, ten involved falls from trees, six involved being struck by falling trees or branches, and four were chainsaw injuries. Among the

diagnosis categories associated with these claims were “Fracture-neck and trunk” (n=9), “Fracture-head” (n=5), and “Disc disorders” (n=4). Four of these claims were fatalities.

Tree work is widely recognized as hazardous. Climbing of trees, in particular, has resulted in some of the most devastating injuries in the landscaping services industry. Administrative controls including performing jobsite surveys, implementing safe procedures, and providing training in safe use of tools and equipment have been recommended to improve safety for those who do tree work.[31]

Engineering controls

The OHBWC offers Safety Intervention Grants (SIGs) for the purchase of “equipment to substantially reduce or eliminate injuries and illnesses associated with a particular task or operation.” Employers must prepare cost-benefit analyses after one and two years of utilizing these engineering controls.[39] A NIOSH and OHBWC study of these analyses demonstrated that the engineering control program contributed to a reduction in WC claim frequency and cost.[40] Another study specifically targeted interventions in the construction industry. That study showed that engineering controls similar to those used in landscaping (manlifts and liftgates) could reduce the risk of WMSDs.[41] In 2020 and 2021, the SIG program was temporarily suspended, but OHBWC expects to resume awarding grants in the near future.

Addressing the challenges of an aging workforce

The increasingly aging workforce brings many challenges for employers. Workers may leave the field early due to injuries, undesirable working conditions, job market, or personal reasons.[37] Implementing multi-dimensional workplace interventions may help to reduce injuries, provide more desirable working conditions, and keep workers in the field for longer.[42] Engineering controls, such as ergonomically designed tools or technology to help with lifting, modify the work environment to fit the worker.[3] The use of such technology may help to prevent injuries due to “Overexertion and bodily reaction” in workers regardless of age. Administrative controls, like job rotation and proper job and safety training, can benefit all workers by providing adequate rest and lowering the risk of injury.[3] Additionally, appropriate personal protective equipment (PPE), like non-slip footwear with reinforced toes, should be worn correctly to prevent injuries due to “Falls, slips, trips” when walking on slippery or sloped surfaces.[5] Fall protection may also prevent injuries due to falling from heights when performing tree care or other tasks on elevated surfaces.[43]

Individual health and wellness are closely tied to work environment.[44] Programs such as the Total Worker Health® (TWH) approach, workplace health promotion (WHP), and the work ability (WA) model can address both the physical and psychological stress from work and help to improve overall health and wellbeing of the worker.[44,45] The OHBWC offers a similar workplace health and wellness program, Better You, Better Ohio!™,[46] to employers in small companies in high-risk industries such as landscaping services.

The TWH approach considers multiple aspects of the work environment, including workplace hazards, psychological stress, and management systems, to improve overall worker well-being.[10] While the TWH approach benefits workers of all ages, it also

encourages productive aging. Productive aging focuses on the positive effects of aging and helps aging adults to make important contributions for themselves, their communities, and society.[10] Productive aging in the workplace addresses workers' physical and mental wellbeing to ensure workers can thrive and contribute at any age.[45]

WHP programs, such as cognitive-behavioral therapy and mindfulness training, have been shown to improve depression, anxiety, and burnout in workers.[6,44] Other forms of WHP, such as resistance training and stretching programs, have been proposed to help decrease the prevalence and severity of upper extremity musculoskeletal disorders (MSDs), but evidence remains limited.[47,48]

Using the WA model, employers can take a multi-dimensional approach to address age-related factors for preventing work-related injuries.[42] The WA model includes factors of the worker, their work, the working community, and professional development to promote work productivity and quality of life of the worker.[42] This leads to a holistic approach to improve working life for workers of all ages. Promoting WA in older workers helps to improve functionality, prolong their working life, and preserve the expertise they bring.[42] A multi-faceted approach to controlling hazards and promoting health and wellness in workers can help to prevent injuries and provide workers with a healthy and fulfilling work environment.

Limitations

To our knowledge, this is the first study in which the role of worker age in WC claims in the landscaping services industry has been examined. With the strong increase in workers 55 years of age and older in this industry, this study is timely and helps to fill a knowledge gap. However, this study is subject to several limitations. This study uses only Ohio WC claims and may not reflect conditions found in other parts of the country, although the findings of this study were consistent with injury data in other studies. Some types of companies are not required to be insured by the OHBWC and public employees are also not included in this analysis, so injuries and illnesses in such firms may not be reflected here. It is possible that WC claims were not filed for some occupational injuries and illnesses in this industry.[49] This is often the case for less serious injuries[51,52] and for chronic conditions such as back pain, carpal tunnel syndrome, and hearing loss.[50]

WC data may record more incidents than BLS data,[53] but multiple studies have shown that reporting of claims to the WC system is declining.[51,54–57] Barriers to filing WC claims, including delays in reimbursement and fear of stigma, were noted in our previous study.[3] Therefore, the rates of injuries and illnesses reported here may be low. However, since 2012, the BLS incidence rate for nonfatal injuries and illnesses in the landscaping services industry is very similar to the rate of all claims to the OHBWC.[3]

Many of the events or exposures listed for these claims were obtained by auto-coding, using the free- text descriptions of the claims and RTW codes.[25] The accuracy of auto-coding is not perfect, but it improves with increasing numbers of claims in a category. Only the most frequently reported events or exposures were examined in this study; the accuracy of coding for these should be better than average. Manual coding, the gold standard for accuracy, was

only performed for some of the LT claims for 2007 – 2017 in this dataset and for the 25% of claims with the lowest probabilities of correct assignment.

Numbers of FTEs in this industry age 65 and older were reported to be exceptionally low in the ACS in 2011 and 2012; those numbers are suspect. There were only 18 LT claims for workers aged 65 and older in this dataset, so firm conclusions on rates of LT injury in this age group cannot be drawn.

Conclusions

Workers aged 55 and older are a rapidly-increasing presence in the landscaping services industry. Although many of them may have less physically demanding jobs than their younger counterparts, they are still at risk of serious occupational injury. Analysis of claim rates and the free-text descriptions of claims in WC data showed differences between the circumstances of claims for younger and older workers. These differences indicate areas where safety interventions can have the greatest impact.

Older workers are injured at lower rates than their younger colleagues overall, but the median nonzero cost when they are injured is higher. The rate of LT "Overexertion and bodily reaction" claims is highest for workers aged 45–54. The most costly claims for workers 55 and older are predominantly for "Falls, slips, trips," while the most costly claims for workers 54 and younger are more likely to be from "Contact with objects and equipment." Workers 54 and younger are more likely than older workers to experience a costly injury during tree work.

Implementation of engineering controls including lifting assist equipment and safer tailgates, trailers, and ramps for loading and unloading of trailers and work vehicles can help to reduce claims from "Overexertion and bodily reaction" and "Falls, slips, trips." To further reduce fall hazards, inclines for walking should ideally be less than 10 degrees and kept clear of contaminants.[33] Diamond weave metal grating can be added to walking surfaces of trailers to increase the friction between the shoes and the walking surface.[33] Keeping safety features of outdoor power equipment in place and in good repair, such as discharge chutes, interlock switches, and guards protecting belts and chains, can help to avoid serious injuries due to "Contact with objects and equipment."[3]

Administrative controls including good work practices and appropriate training, including surveying the site before beginning work, are also valuable, especially when performing tree work. Minimizing work at height can help to reduce devastating falls. Proper maintenance of landscaping equipment to repair and replace worn or broken mower brakes, powered and manual hand tools, ladders, cutting tool blades, and machine guarding is also essential. The knowledge and skills of older workers could make them excellent mentors for young and newly-hired workers, who have the highest rates of MO claims, especially from "Contact with objects and equipment."

The TWH program, WHP, and the WA model offer tools to improve worker health and to fit the workplace to the worker. These interventions would benefit all workers, but older workers in particular, in avoiding injuries due to "Falls, slips, trips" and "Overexertion and

bodily reaction." Avoiding injuries to younger workers, such as those caused by "Contact with objects and equipment," may preserve their health for a long and active working life.

Further research is recommended on WC databases from other jurisdictions to validate the findings of this research on Ohio WC claims. Differing climate conditions in different parts of the United States may result in different hazards. Research is also recommended on the efficacy of workplace interventions in decreasing the risk of occupational injury or illness. Such studies, though difficult to conduct, are essential in targeting the most effective controls for workplace hazards.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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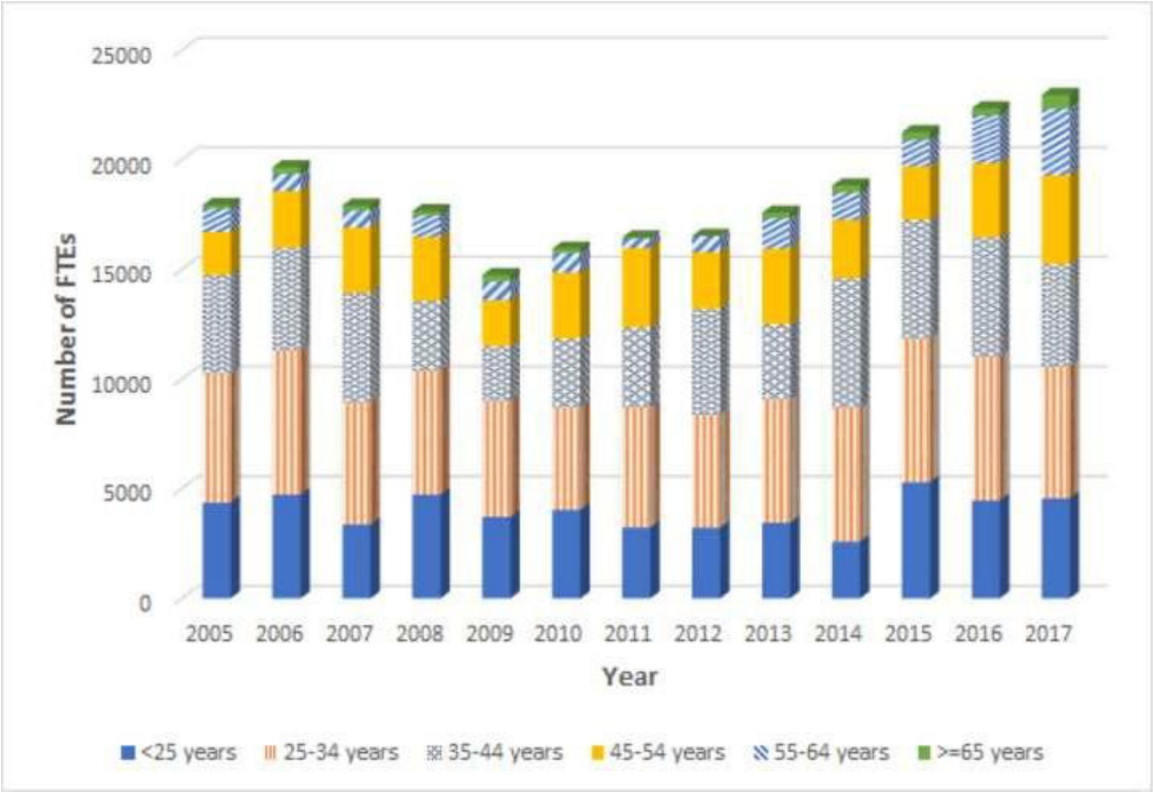

Figure 1.
Employment (Full-Time Equivalent employees, FTEs) in the landscaping services industry, census group 7770, in Ohio by year and age group according to American Community Survey data.

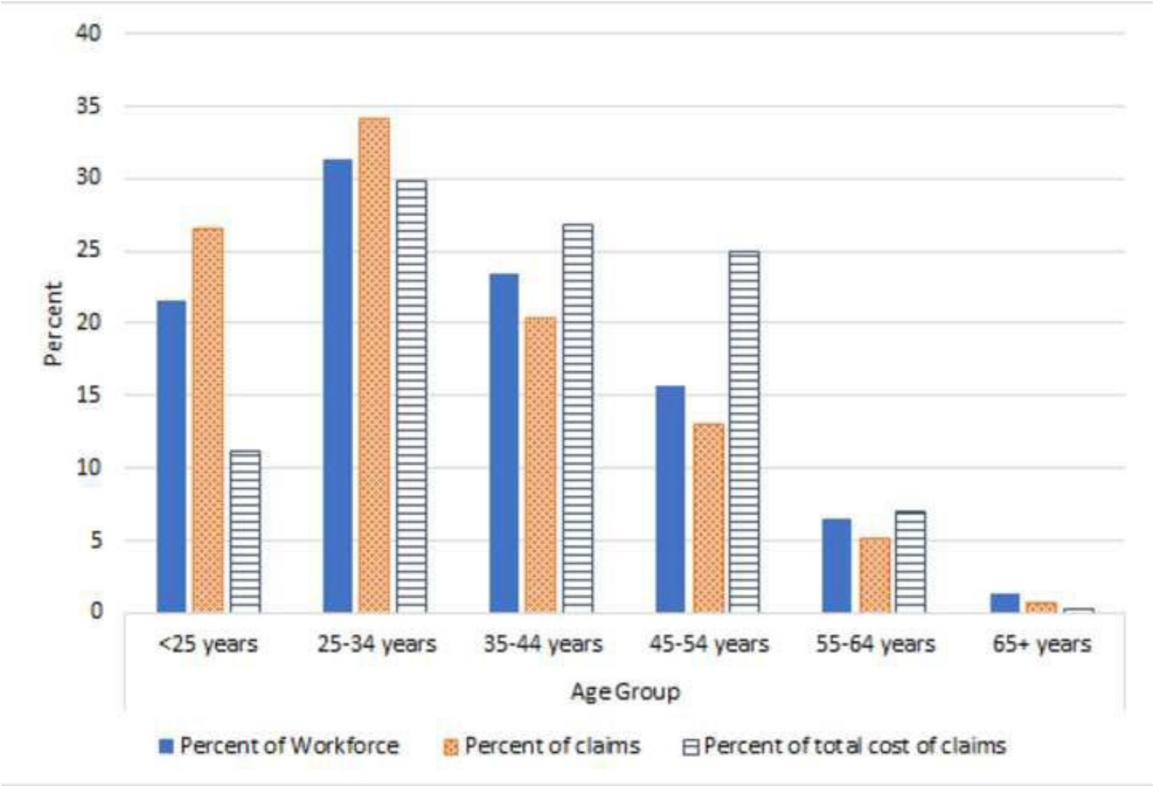

Figure 2.

Percentages of workforce (as estimated by the U.S. Census Bureau American Community Survey) in the private sector landscaping services industry in the state of Ohio for 2005–2017, claims to the Ohio Bureau of Workers' Compensation, and claim cost by age group.

Table 1.

Rates of medical-only (MO) and lost-time (LT) claims to the Ohio Bureau of Workers' Compensation from the landscaping services industry (NAICS 56173) per 10,000 FTE (full-time equivalent employees) by event or exposure and age category.

	MO claim rate per 10,000 FTE (number of claims)						LT claim rate per 10,000 FTE (number of claims)					
	Age category						Age category					
Event or exposure	**<25 years**	**25–34 years**	**35– 44 years**	**45– 54 years**	**55– 64 years**	**65+ years**	**<25 years**	**25– 34 years**	**35–44 years**	**45– 54 years**	**55–64 years**	**65+ years***
Violence and other injuries by persons or animals	32.8 (n=170)	30.1 (n=226)	20.9 (n=118)	18.1 (n=68)	12.8 (n=20)	0 (n=0)	0.6 (n=3)	1.1 (n=8)	1.4 (n=8)	0.5 (n=2)	0.6 (n=1)	0.0 (n=0)
Transportation incidents	11.9 (n=62)	14.5 (n=109)	7.5 (n=42)	5.0 (n=19)	12.2 (n=19)	6.1 (n=2)	5.8 (n=30)	10.5 (n=79)	7.6 (n=43)	10.9 (n=41)	7.7 (n=12)	3.0 (n=1)
Fires and explosions	0.0 (n=0)	0.0 (n=0)	0.2 (n=1)	0.0 (n=0)	0.0 (n=0)	0.0 (n=0)	0.2 (n=1)	0.1 (n=1)	0.2 (n=1)	0.0 (n=0)	0.0 (n=0)	0.0 (n=0)
Falls, slips, trips	60.1 (n=312)	53.0 (n=398)	47.7 (n=269)	56.6 (n=213)	58.4 (n=91)	75.9 (n=25)	16.4 (n=85)	22.5 (n=169)	24.3 (n=137)	31.9 (n=120)	34.6 (n=54)	33.4 (n=11)
Exposure to harmful substances or environments	50.1 (n=260)	32.0 (n=240)	18.5 (n=104)	13.5 (n=51)	13.5 (n=21)	18.2 (n=6)	1.5 (n=8)	0.9 (n=7)	0.9 (n=5)	0.8 (n=3)	1.9 (n=3)	3.0 (n=1)
Contact with objects and equipment	297.2 (n=1,542)	222.1 (n=1,668)	164.7 (n=928)	144.5 (n=544)	139.8 (n=218)	75.9 (n=25)	33.0 (n=171)	34.0 (n=255)	31.2 (n=176)	36.1 (n=136)	24.4 (n=38)	12.1 (n=4)
Overexertion and bodily reaction	67.5 (n=350)	78.2 (n=587)	61.7 (n=348)	53.1 (n=200)	53.2 (n=83)	30.4 (n=10)	12.7 (n=66)	24.9 (n=187)	29.1 (n=164)	31.1 (n=117)	25.7 (n=40)	3.0 (n=1)
All events	522.5 (n=2,711)	432.3 (n=3,247)	322.9 (n=1,820)	292.7 (n=1,102)	290.6 (n=453)	209.5 (n=68)	70.2 (n=364)	94.4 (n=709)	95.5 (n=538)	112.4 (n=423)	95.6 (n=149)	54.6 (n=18)
Overall (MO plus LT) claim rates for all events	592.6 (n = 3,075)	526.7 (n = 3,956)	418.4 (n = 2,358)	405.1 (n = 1,525)	386.1 (n = 602)	261.1 (n = 86)						

*There were only 18 LT claims in this age group.

Table 2.

Rates of frequent types of injuries per 10,000 full-time equivalent employees (FTE) in medical-only (MO) and lost-time (LT) claims to the Ohio Bureau of Workers' Compensation from the landscaping services industry, 2005 – 2017.

	MO claims rate per 10,000 FTE by age group (number of claims)						LT claims rate per 10,000 FTE by age group (number of claims)					
	Age group						Age group					
Diagnosis category	**<25 years**	**25–34 years**	**35–44 years**	**45–54 years**	**55–64 years**	**65+ years**	**<25 years**	**25–34 years**	**35–44 years**	**45–54 years**	**55–64 years**	**65+ years***
Open wounds	165.6 (n=859)	115.7 (n=869)	81.3 (n=458)	69.6 (n=262)	73.8 (n=115)	45.5 (n=15)	8.7 (n=45)	8.1 (n=61)	6.7 (n=38)	6.6 (n=25)	5.8 (n=9)	0.0 (n=0)
Contusion	63.6 (n=330)	49.0 (n=368)	44.4 (n=250)	40.4 (n=152)	40.4 (n=63)	39.5 (n=13)	2.1 (n=11)	4.9 (n=37)	2.7 (n=15)	3.5 (n=13)	3.8 (n=6)	3.0 (n=1)
Sprains-lower extremity	42.6 (n=221)	39.0 (n=293)	28.7 (n=162)	26.8 (n=101)	18.6 (n=29)	12.1 (n=4)	6.0 (n=31)	9.5 (n=71)	9.4 (n=53)	8.8 (n=33)	7.7 (n=12)	6.1 (n=2)
Sprains-back	31.6 (n=164)	46.3 (n=348)	31.1 (n=175)	22.0 (n=83)	17.3 (n=27)	9.1 (n=3)	4.6 (n=24)	11.3 (n=85)	11.2 (n=63)	8.2 (n=31)	5.1 (n=8)	3.0 (n=1)
Sprains-upper extremity	24.5 (n=127)	25.2 (n=189)	21.5 (n=121)	21.5 (n=81)	21.2 (n=33)	18.2 (n=6)	2.9 (n=15)	6.4 (n=48)	6.6 (n=37)	11.4 (n=43)	15.4 (n=24)	3.0 (n=1)
Fracture-upper extremity	21.0 (n=109)	16.1 (n=121)	13.0 (n=73)	13.3 (n=50)	10.9 (n=17)	12.1 (n=4)	9.4 (n=49)	9.6 (n=72)	7.1 (n=40)	11.4 (n=43)	8.3 (n=13)	15.2 (n=5)
Fracture-lower Extremity	3.1 (n=16)	3.9 (n=29)	3.7 (n=21)	4.3 (n=16)	9.0 (n=14)	9.1 (n=3)	8.5 (n=44)	8.8 (n=66)	12.6 (n=71)	10.9 (n=41)	7.7 (n=12)	9.1 (n=3)
Disc disorders	0.6 (n=3)	0.5 (n=4)	1.1 (n=6)	0.8 (n=3)	1.3 (n=2)	0.0 (n=0)	2.5 (n=13)	8.0 (n=60)	8.2 (n=46)	7.2 (n=27)	2.6 (n=4)	0.0 (n=0)
Soft tissue/ Enthesopathy	3.3 (n=17)	3.9 (n=29)	3.7 (n=21)	8.5 (n=32)	8.3 (n=13)	3.0 (n=1)	1.2 (n=6)	4.0 (n=30)	4.1 (n=23)	6.1 (n=23)	4.5 (n=7)	0.0 (n=0)
Dislocation	1.3 (n=7)	1.3 (n=10)	2.3 (n=13)	2.7 (n=10)	5.1 (n=8)	3.0 (n=1)	2.5 (n=13)	2.5 (n=19)	4.3 (n=24)	4.5 (n=17)	6.4 (n=10)	0.0 (n=0)
Fracture-neck and trunk	0.0 (n=0)	0.5 (n=4)	1.4 (n=8)	2.7 (n=10)	5.8 (n=9)	9.1 (n=3)	1.5 (n=8)	2.8 (n=21)	3.0 (n=17)	4.3 (n=16)	5.1 (n=8)	3.0 (n=1)
Fracture-head	1.0 (n=5)	1.2 (n=9)	0.5 (n=3)	0.5 (n=2)	0.6 (n=1)	0.0 (n=0)	1.5 (n=8)	1.2 (n=9)	1.2 (n=7)	2.7 (n=10)	0.6 (n=1)	0.0 (n=0)

*There were only 18 LT claims in this age group.

Table 3.

Percent of free text descriptions of medical-only (MO) and lost-time (LT) claims to the Ohio Bureau of Workers' Compensation from the landscaping services industry, 2005 – 2017, for each age group, containing one of the given words or groups of words. Table is ordered by decreasing frequency of words found in all MO claims combined.

	Percent of MO claims with one of these words						Percent of LT claims with one of these words					
	Age group						Age group					
Word or group of words	**<25 years**	**25-34 years**	**35-44 years**	**45-54 years**	**55-64 years**	**65+ years**	**<25 years**	**25-34 years**	**35-44 years**	**45-54 years**	**55-64 years**	**65+ years***
Hand/finger/thumb/ pinky	28.3	24.1	25.1	23.6	20.1	24.6	28.3	20.2	16.7	18.4	14.8	22.2
Foot/knee/ ankle/leg/toe	19.0	18.9	17.8	20.1	18.8	20.3	32.1	23.1	26.6	25.5	28.9	16.7
Cut	19.1	17.2	16.2	14.2	14.3	11.6	14.3	12.4	11.3	11.3	8.7	5.6
Head/neck/eye/face/ nose/ear/chin/cheek	16.2	17.4	16.7	18.3	15.5	11.6	6.6	8.7	7.2	8.5	11.4	22.2
Tree/branch/wood/ limb/log	14.0	15.3	15.8	15.6	15.5	13.0	19.0	21.7	21.2	20.8	18.1	5.6
Truck/trailer/ tailgate	13.0	15.4	14.9	16.9	16.1	14.5	25.3	22.8	20.3	22.9	24.2	33.3
Fell or fall	12.3	12.2	14.6	18.1	19.2	29.0	22.5	24.3	21.2	26.0	36.2	50.0
Shoulder/elbow/ wrist/arm	9.5	10.0	9.5	12.5	14.3	18.8	10.4	12.3	11.0	18.4	21.5	11.1
Slip	7.8	7.5	8.9	10.0	11.0	14.5	11.5	8.3	8.9	12.5	13.4	27.8
Mow	10.0	9.4	7.0	4.6	4.2	14.5	14.0	12.4	7.2	5.4	11.4	5.6
Trim	7.6	6.4	4.9	6.0	3.8	5.8	0.5	3.4	3.0	2.8	4.0	0
Phrases pertaining to the back	0.0	9.0	7.8	7.6	7.9	1.4	8.2	14.7	16.0	9.0	10.1	16.7
Pull	5.5	5.5	5.0	6.9	5.5	2.9	4.7	6.5	7.2	7.3	6.7	0
Lift	4.2	5.2	4.7	4.9	6.0	1.4	6.9	6.8	7.1	6.9	6.7	0

*There were only 18 LT claims in this age group.

Table 4.

Median nonzero costs of medical-only (MO) and lost-time (LT) claims to the Ohio Bureau of Workers' Compensation (OHBWC) from the landscaping services industry by age category, 2005 – 2017.

	Median nonzero MO costs (number of nonzero claims)						Median nonzero LT costs (number of nonzero claims)					
	Age category (number of total MO claims)						Age category (number of total LT claims)					
Type of cost	**<25 years (n = 2,711)**	**25–34 years (n = 3,247)**	**35–44 years (n = 1,820)**	**45–54 years (n = 1,102)**	**55–64 years (n = 453)**	**65+ years (n = 68)**	**<25 years (n = 364)**	**25–34 years (n = 709)**	**35–44 years (n = 538)**	**45–54 years (n = 423)**	**55–64 years (n = 149)**	**65+ years (n = 18)***
Medical cost only	$453 (n = 2,399)	$478 (n = 2,844)	$510 (n = 1,637)	$587 (n = 994)	$643 (n = 419)	$769 (n = 61)	$6,424 (n = 361)	$9,148 (n = 701)	$12,942 (n = 535)	$14,235 (n = 419)	$15,652 (n = 147)	$5,713 (n = 18)
Indemnity cost only	$1,923 (n = 20)	$1,895 (n = 38)	$2,332 (n = 40)	$3,846 (n = 24)	$1,506 (n = 19)	$3,000 (n = 1)	$5,669 (n = 247)	$9,590 (n = 521)	$12,899 (n = 415)	$18,500 (n = 323)	$20,156 (n = 114)	$3,196 (n = 13)
Total cost	$454 (n = 2,400)	$482 (n = 2,845)	$519 (n = 1,639)	$598 (n = 995)	$681 (n = 419)	$769 (n = 61)	$10,895 (n = 363)	$16,328 (n = 705)	$23,245 (n = 538)	$27,069 (n = 420)	$27,630 (n = 149)	$9,470 (n = 18)
Overall (MO plus LT) nonzero median total cost (n=1,050 claims had zero cost to OHBWC)	$522 (n = 2,763)	$629 (n = 3,550)	$761 (n = 2,177)	$975 (n = 1,415)	$996 (n = 568)	$1,002 (n = 79)						

*There were only 18 LT claims in this age group.

Table 5.

Percent of common events, injuries, and keywords in the 100 most costly claims to the Ohio Bureau of Workers' Compensation from the landscaping services industry, 2005–2017.

	Percent of 100 most costly claims		
Most common events	**100 most costly claims for all ages**	**100 most costly claims for ages 54 years and younger**	**100 most costly claims for ages 55 years and older**
Contact with objects and equipment	39	38	23
Falls, slips, trips	26	24	40
Overexertion and bodily reaction	17	17	27
Transportation incidents	14	16	8
Most common injury types			
Disc disorders	18	23	5
Fracture - neck and trunk	10	9	5
Fracture - head	9	8	2
Fracture - lower extremity	8	9	8
Fracture - upper extremity	4	4	11
Dislocation	4	3	9
Sprains - upper extremity	0	1	17
Most common words in free-text description			
Tree/branch/wood/limb/log	34	35	18
Fell or fall	26	23	37
Foot/knee/ankle/leg/toe	20	18	25
Shoulder/elbow/wrist/arm	10	8	27
Cut	10	11	7
Total cost			
	$ 75,830,701.10	$ 73,854,247.91	$ 11,217,783.25