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Factors associated with occupational injuries in seasonal young workers

M. Parish[1], D. S. Rohlman[1,2], D. L. Elliot[3] and M. Lasarev[1]

[1]Oregon Institute of Occupational Health Sciences, Oregon Health & Science University, Portland, OR 97239, USA, [2]Department of Occupational and Environmental Health, University of Iowa, Iowa City, IA 52242, USA, [3]Division of Health Promotion & Sports Medicine, Oregon Health & Science University, Portland, OR 97239, USA.

Correspondence to: M. Parish, Oregon Institute of Occupational Health Sciences, Oregon Health & Science University, 3181 SW Sam Jackson Park Road—L606, Portland, OR 97239, USA. Tel: +1 503 494 2532; fax: +1 503 494 3849; e-mail: parish@ohsu.edu

Background	Younger workers are more likely to be injured on the job than older workers. Investigation tends to focus on work-related explanatory factors but often neglects non-work-related causes.
Aims	To identify both work- and non-work-related factors that contribute to younger workers' injuries in seasonal work.
Methods	Two surveys of a set of seasonal parks and recreation workers were conducted measuring health and safety behaviours and self-reported injuries.
Results	Seventy per cent reported an injury at work over the summer. Among young workers, each additional year of age was associated with an almost 50% increase in injury rate ($P < 0.05$). Odds of injury in women were three times those for men ($P < 0.05$). We observed a linear relationship between average hours worked per week and injuries ($P < 0.001$). Alcohol abuse ($P < 0.05$) was also associated with injuries.
Conclusions	Higher injury rates among younger workers in this sample is multifactorial and encompasses both work and non-work factors and suggest that more global approaches are required to address young worker safety.
Key words	Health; safety; seasonal workers; occupational injuries; young workers.

Introduction

Younger workers aged 14–24 represent 14% of the US workforce [1]. Many of these workers are seasonally employed. Although their employment provides income and fosters responsibility, they are also injured at approximately twice the rate of older employees [2]. The reasons for these higher injury rates are not well understood but may include lack of job experience or training, failure to recognize workplace hazards, factors related to cognitive and physical development, lifestyle habits and limited ability to communicate effectively with supervisors [2–4].

Identifying factors that contribute to injuries is important in developing effective interventions. The goal of this initial research study was to identify contributing factors to injury in a group of seasonally employed young workers.

Methods

Youth and young adults aged 14–24 hired by an urban parks and recreation department to work at community swimming pools during the summer were eligible to participate. Information about the study was presented at job-orientation sessions, and parental consent letters were distributed to minors. Interested participants provided an email address and were sent a link to a voluntary, confidential 133-item online survey. Following summer employment, a second link to a 57-item follow-up survey was distributed. Data were linked using email address and a personalized participant-selected code [4]. Respondents were emailed $5 and $10 gift cards upon completion of the first and second survey, respectively.

The initial survey collected participant demographics, work history, knowledge of work safety topics, health behaviours and personality characteristics. The second survey

gathered information about the work environment, hours worked and injuries during summer employment. Surveys were administered using Survey Gizmo (http://www.surveygizmo.com/). Survey items and constructs were drawn from a variety of sources and are detailed in Table S1 (available as Supplementary data at *Occupational Medicine* Online).

Information about the frequency, type and severity of injuries reported by participants during summer employment was collected using a standardized measure [5]. Because of potential variability in interpreting anchoring statements (e.g. never, rarely, sometimes, often, very frequently), injury counts were dichotomized as 'none' or 'one or more'. Respondents also indicated whether they had filed a required incident report if they had been injured on the job.

Data were analysed with SPSS Version 22. Logistic regression was used to determine associations of individual risk factors with injury at work as a dichotomous outcome variable. The Oregon Health & Science University Institutional Review Board approved materials and procedures.

Results

Three hundred and forty-eight out of ~700 employees met criteria for participation and provided email addresses. Seventy-three addresses were invalid, leaving 275 valid addresses for those sent the initial survey. A total of 187 younger workers (68%) completed the survey. At the end of the summer, ~6 weeks after the initial survey, the second survey was sent to the initial 275 participants, and 89 workers responded. Sixty-nine participants completed both surveys and had comparable demographic, health and work history characteristics to the other participants (Table 1). The majority were female (70%) and the average age was 17.8 years. Their ethnic distribution reflected local demographics, with 83% of Oregon's population being White [6]. Approximately half reported this was their first job. Body mass index for the majority was in the normal range (<25); only 14% were categorized as overweight or obese.

Seventy per cent reported at least one workplace injury during the summer. Most were minor scrapes, bruising or strains. There were two reported serious injuries: one fracture and one concussion. These were the only injuries for which workers reported missing work. Although the employer had a policy requiring reporting of any injury, only four respondents reported filing an incident report.

Table 2 summarizes associations between survey factors and injuries. Women were more likely to be injured on the job. Participant risk for self-reported injuries also increased with age and greater average hours worked per week. Alcohol abuse was significantly associated with reported injuries; those that reported being drunk within

Table 1. Study population characteristics of participants who completed one or both surveys

Variable	Completed the initial survey (N = 187)	Completed only initial survey (N = 118)	Completed both initial and follow-up survey (N = 69)
Age, mean (SD)	17.9 (2.3)	17.9 (2.4)	17.8 (2.0)
Gender, *n* (%)			
Male	65 (35)	44 (37)	21 (30)
Female	122 (65)	74 (63)	48 (70)
Ethnicity[a], *n* (%)			
White	163 (87)	105 (89)	58 (84)
Latino	6 (3)	4 (3)	2 (3)
Black	5 (3)	2 (2)	3 (4)
Asian	22 (12)	11 (9)	11 (16)
Other	23 (12)	13 (11)	10 (7)
General health, *n* (%)	74.7 (19)	74.5 (19)	75.1 (18)
BMI, mean (SD)	22.1 (3.0)	22.3 (3.1)	21.8 (2.9)
Total work, *n* (%)			
First job	86 (46)	56 (47)	30 (43)
<1 year	9 (5)	6 (5)	3 (4)
1–3 years	42 (22)	20 (17)	22 (32)
≥4 years	50 (27)	36 (30)	14 (20)
Average hours worked/week, *n* (%)			
1–9			6 (9)
10–19			26 (38)
20–29			14 (20)
30–39			21 (30)
>40			2 (3)

BMI, body mass index.
[a]May have entered more than one ethnicity.

Table 2. Results from logistic regression showing the relationship between injury and individual occupational and non-occupational risk factors

Variable	Odds ratio	95% Confidence interval	Significance (*P*)
Non-work factors			
Age (per additional year)	1.43	1.06–2.04	<0.05
Gender			
Male	Reference		
Female	3.06	1.03–3.28	<0.05
Work experience			NS
≥4 years	Reference		
First job	1.30	0.32–1.6	
<1 year	1.11	0.08–27.5	
1–3 years	1.48	0.34–6.36	
Alcohol abuse			
Never drunk last 30 days	Reference		
Ever drunk last 30 days	6.67	1.18–126.00	<0.05
Exercise habits (per additional day exercising at least 1 h)	0.80	0.60–1.03	NS
General health (per 20 point increment)	0.90	0.49–1.62	NS
Sleepiness (per additional 1 point)	0.97	0.87–10.80	NS
BMI (per additional 1 kg/m^2 unit)	0.95	0.80–1.13	NS
Recklessness (per additional 0.5 point)	2.19	0.92–6.79	NS
Rebelliousness (per additional 1 point)	1.69	0.81–4.28	NS
Emotional intelligence (per additional 10 points)	1.06	0.73–1.56	NS
Work-related factors			
Safety motivation and compliance[a] (per additional 1 point)	0.98	0.84–1.14	NS
Supervisor support[a] (per additional 1 point)	1.62	0.84–3.33	NS
Safety climate[a] (per additional 1 point)	1.05	0.79–1.40	NS
Safety knowledge (per additional percentage point)	5.69	0.25–143.49	NS
Hours worked[a] (per 10 additional hours)	3.18	1.72–6.83	<0.001

NS, non-significant.
[a]Measured at post-survey.

the last 30 days were over six times more likely to report an injury. Trends were observed for rebelliousness and increased injuries while higher levels of exercise demonstrated an associated trend with fewer injuries.

Discussion

Our study found that demographic variables, worksite dynamics and lifestyle factors appeared to play roles of varying significance in occupational injuries among young workers. Our findings are one of the few recent assessments of factors relating to injuries among seasonally employed young workers. Our participants were generally healthy, with only 14% characterized as overweight or obese, which is less than half that prevalence (30%) observed in the 2013 national Youth Risk Behavior Survey (YRBS) cohort [7]. However, alcohol use was comparable to that same cohort's findings, with 19% of younger workers reported getting drunk in the last month, close to the 21% YRBS estimate for high school students nationwide [7]. Some relationships were anticipated, such as associations with longer work hours and binge drinking. However, other items, such as greater risk in females, and a lack of relationship to purported emotional characteristics of adolescents were unexpected. Prior studies present a mixed picture of gender effects. While some studies report males may be at greater risk for injuries [8], others find no gender differences [9]. The few near-miss reports filed suggest that under-reporting appears to be common in all young workers.

These analyses were exploratory, and findings were limited by a small sample size and a homogeneous, relatively healthy, upper socio-economic status population. Additionally, these participants worked for an employer that required safety trainings prior to the start of work and weekly safety meetings; these circumstances may be reflected in the findings. Therefore, evaluation of other young worker groups is needed. In addition, more specific injury assessment in a larger worker group would allow for more precision in the results. Finally, there may be additional unmeasured confounders that may be important covariates or modifiers of the relationship between our measures. However, our results can guide design of future work.

Importantly, findings support strategies that address both occupational and non-occupational risk factors as a relevant approach for young worker interventions. Demographic variables, worksite dynamics, such as hours worked, and lifestyle factors, including alcohol use and exercise, all appear to play roles of varying significance.

Addressing their needs requires a broad approach to curb injuries and promote a healthy emerging workforce.

Key points

- Demographic variables, worksite dynamics, such as hours worked, and lifestyle factors, including alcohol use and exercise, appeared to play roles of varying significance in occupational injuries among young workers.
- Higher injury rates among young workers in this sample were multifactorial, and therefore, findings from this study support strategies that address both occupational and non-occupational risk factors in young worker interventions.

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Conflicts of interest

D.S.R. has a significant financial interest in Northwest Education Training and Assessment, LLC, a company that may have a commercial interest in the results of this research and technology. This potential conflict of interest was reviewed and a management plan approved by the Oregon Health & Science University (OHSU) Conflict of Interest in Research Committee was implemented. ATLAS and ATHENA are programmes on the Substance Abuse and Mental Health Services Administration's National Registry of Evidence-based Programs and Practices, and they are distributed through the Center for Health Promotion Research at OHSU. OHSU and D.L.E. have a financial interest from the sale of those technologies. The potential conflict of interest has been reviewed and managed by the OHSU Conflict of Interest and Research Committee. For the remaining authors, no conflict of interest was declared.

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