ORIGINAL ARTICLE

School-sponsored work programs: a first look at differences in work and injury outcomes of teens enrolled in school-to-work programs compared to other-working teens

Kristina M Zierold,[1] Savi Appana,[2] Henry A Anderson[3]

[1]Department of Epidemiology and Population Health, School of Public Health and Information Sciences, University of Louisville, Louisville, Kentucky, USA
[2]Department of Biostatistics, University of Louisville, Louisville, Kentucky, USA
[3]Wisconsin Department of Health and Family Services, Division of Public Health, Madison, Wisconsin, USA

Correspondence to
Dr Kristina M Zierold, Department of Epidemiology and Population Health, School of Public Health and Information Sciences, University of Louisville, Louisville, KY 40202, USA; kmzier02@louisville.edu

Accepted 10 February 2011
Published Online First 12 March 2011

ABSTRACT

Objectives To evaluate work experiences among teens enrolled in school-sponsored work (SSW) programs and compare the findings to other-working teens. This study, the first to assess work-related safety and health for teens in SSW programs, includes teens working one job and teens working multiple jobs.

Methods A survey was conducted among 6810 teens in school districts in five public health regions in Wisconsin. Information on demographics, work characteristics, injury and school performance was collected.

Results Of 3411 high school teens (14–18 years old) working during the school year, 461 were enrolled in SSW programs. SSW teens were more likely to hold multiple jobs, work over 40 h per week, and work 2 or more days per week before 8:00 h compared with other-working teens. SSW teens working only one job were no more likely to be injured than other-working teens. However, SSW teens working multiple jobs were significantly more likely to be severely injured compared to other-working teens (AOR 3.49; 95% CI 1.52 to 8.02).

Conclusions SSW programs were created to prepare youth for transition into the workforce after high school. This first study suggests that students in SSW programs working only one job are no more likely to be injured at work compared with other-working teens. However, being enrolled in SSW programs is not protective against work injury, which would have been expected based on the philosophy of these programs. Furthermore, when students work multiple jobs, those enrolled in SSW programs are more likely to be severely injured. Possible explanations are provided.

What this paper adds

- No evaluation of school-sponsored work (SSW) programs has been previously carried out.
- Although over 70% of high schools in the USA offer SSW programs, the safety of the enrolled teens has not been assessed.
- Teens enrolled in SSW programs working one job are no more likely to be injured than other-working teens, although being enrolled in these programs is not protective against work injury.
- Teens enrolled in SSW programs are 3.5 times more likely to suffer a severe injury if they are working multiple jobs compared to other-working teens working multiple jobs.
- As over 40% of teens in SSW programs work multiple jobs and many work hours equivalent to a full time job, schools need to ensure that teens enrolled in SSW programs and their employers follow child labour laws.

INTRODUCTION

The School-To-Work Opportunities Act (STWOA) was passed in 1994 to support high school youth in US public schools transitioning from school to career-focused work. The Act was intended to address concerns that many youth lacked the skills necessary to succeed in the changing US job market and that young workers were frequently involved in periods of unemployment, job instability and work in dead-end jobs.[1]

The Act created a work-based learning program that was modelled on the concept of an apprenticeship, which would integrate school-based instruction with structured on-the-job training. One of the strengths of the Act was that it permitted flexibility among states, allowing them to determine their own form of school-sponsored work (SSW) programs. The STWOA created three basic categories of SSW programs: (1) school-based activities, which consist of classroom instruction focused on workplace experiences; (2) work-based activities, which include structured training and work experiences outside school-time instruction; and (3) connecting activities, which involve efforts to help schools and employers maintain bonds between school-based and work-based activities.

In an assessment of US high schools providing SSW programs, 94% of schools offered six or more school-based activities, such as career counselling and job site visits, while 46% offered six or more work-based activities, such as curriculum changes building on work experience. In total, 82% of teachers reported being involved in connecting activities, such as attending professional meetings with themes related to SSW programs.[2] Schools located in urban areas and schools with more minority students and teachers have more SSW activities compared with other schools.

Although federal funding related to the STWOA ended in 2001, many states have continued to provide SSW program activities for high school students. In 2004, the US Department of Education

reported that 71.8% of public high schools with 12th grade pupils offered work-based learning programs for credits. Additionally, 60% of schools offered job-shadowing programs.[3]

Since the inception of the Act, limited research has been conducted to assess SSW programs.[2 4–6] Most of the assessment of SSW programs has been limited to analyses of the types of programs offered and the demographic characteristics of the schools and students. To date, no studies have investigated the work-related characteristics and occurrence of injury among students enrolled in SSW programs.

Injuries among young workers are an enduring problem. In 2006, an estimated 52 600 injuries among youth aged 15–17 years old were treated in emergency departments in US hospitals. The numbers of work-related injuries among teens are greatly underestimated as the National Institute for Occupational Safety and Health believes that only one-third of work-related injuries and illnesses are treated in hospital emergency departments.[7] In addition to non-fatal injuries, teens are also killed at work. The Bureau of Labor Statistics reports that 38 US teens <18 years old died in 2007, with 18 deaths of these deaths occurring to teens <16 years of age.[7] Injury rates among teens are high and have remained high throughout the past decade. With more than 70% of teenagers working for pay before graduating from high school,[8–12] work-related injuries are a major public health concern. Studies investigating injuries among working teens have found that these workers are approximately twice as likely as adults to suffer injuries resulting in workers' compensation claims and emergency room visits.[13–16]

Since SSW programs are based on the apprenticeship model, where teens can learn job skills while under the guidance of a mentor, with additional school-based guidance, we might expect that fewer work-related injuries would occur among SSW teens compared with other-working teens; however, we have no information to help us assess this situation. The objective of this study was to evaluate differences in work characteristics, including jobs and tasks, total hours worked per week, and times of day worked between SSW teens and other-working teens. Furthermore, we evaluated the prevalence of injury and severe injury and the workplace safety climate among teens enrolled in SSW programs and compared them to other-working teens. This study presents the first analysis of teens enrolled in SSW programs and their job experiences.

METHODS

The data for this study came from a survey of high school students throughout the state of Wisconsin. Wisconsin is an excellent source of data regarding SSW programs, because it was the first state in the USA to establish a comprehensive youth apprenticeship program. The Wisconsin youth apprentice program was one of four programs used as a model by the federal government to develop the STWOA in 1994.[17]

As a component of an adolescent occupational injury surveillance project in Wisconsin, a questionnaire was developed to investigate and characterise employment and injury among a diverse population of high school teens throughout the five public health regions of Wisconsin. Multiple school districts were included. A detailed description of data collection methods has been given previously.[18 19] The teens were instructed to answer the questionnaire regarding their work experiences for the 2002–2003 school year.

The original project which involved the collection of data from the high school teens during 2001–2003 was considered 'exempt' by the Institutional Review Board affiliated with the Wisconsin Division of Public Health because the questionnaire was anonymous and no personal identifiers were collected from the teens. Passive consent was used to obtain consent from the parents of the students. Furthermore, the secondary analysis evaluating SSW programs was also considered 'exempt' by the Institutional Review Board of the University of Louisville because the data contained no identifiers.

Measures

The measures used in this study can be classified into five categories: working status, work characteristics, injuries, safety climate and sociodemographics.

Work status

To determine the working status of the teens answering the questionnaire, we asked the following question: "During the school year, have you worked? (Include any work done on your family's farm or family owned business, any paid work for a company or business, any paid work involving regular baby-sitting, lawn mowing or snow shovelling jobs, or any paid school-to-work job experience time.) (Y/N)". If the teen answered "No", they were instructed to go to the end of the questionnaire and answer questions about school performance and school-based behaviours. If the teen answered "Yes", the next question asked on the questionnaire was, "During the school year, have you been employed and paid as a part of a school-sponsored 'work experience' program? (Y/N)".

Number of jobs worked

For this study, teens were stratified into groups based on the number of jobs they held. Teens who worked only the SSW job and other-working teens who worked only one job were stratified to the group called 'One Job'. SSW teens who worked their SSW job plus other jobs and other-working teens who worked more than one job were stratified into the group called 'Multiple Jobs'.

Work characteristics

Variables included occupations and tasks the teens did during the school year, the number of hours worked per week, the times the teens worked at night, and whether the teens worked before 8:00 h in the morning. Nineteen occupations and 19 tasks were listed for the teens to choose. If the occupation or task that the teen did was not listed, the teens could select 'Other' and fill in their answer. Teens could choose multiple occupations and multiple tasks from the list. The number of hours worked per week were defined as: 5 h or less, 6–10 h, 11–16 h, 17–22 h and more than 23 h. There were three categories for how late the teen worked (earlier than 19:00 h, between 19:00 and 23:00 h, after 23:00 h) and three categories for how many days per week the teen worked before 8:00 h (never, 1 day, 2 or more days).

Injuries

Two separate questions were used to determine injury status. One question asked, "During the school year, have you been injured at work? (Y/N)". This question provided us with an overview of the percentage of teens reporting injury; however, we were also interested in teens who reported being severely injured. We defined 'severely injured' as having any injury that affected a teen's normal activity for longer than 3 days. Therefore, the second injury question was: "Did the injury affect your normal activities at home, school or work for longer than 3 days? (Y/N)". As a additional measure of severity of injury, we asked whether the teens filed for workers' compensation. We asked, "Did you file a workers' compensation claim for your injury? (Y/N)".

To get a detailed picture of the types of injury that the teens sustained, we asked the following questions: "What type of injury did you experience?" (eg, cut, bruise and burn), "What part of the body was affected?" (eg, finger(s)/hand(s), toe(s)/foot (feet), head, etc) and "How did the injury occur?" (eg, slip, trip or fall from a flat surface, contact with hot fluid or grease, etc). Multiple choices were provided, but teens could select 'Other' and provide descriptions of their injuries.

Safety climate at work

In addition to assessing injury, we were interested in evaluating the safety climate of the teens' jobs. Therefore we asked series of questions concerning danger and training. Five questions were asked as follows: "During the school year, have you been asked to do something at work that you thought was dangerous? (Y/N)", "During the school year, have you been in a 'near miss' incident where you were almost injured at work? (Y/N)", "Did you receive work-related safety training before taking on new tasks at work? (Y/N)", "Were you informed of your legal rights and responsibilities as they relate to workplace safety and health? (Y/N)" and "During the school year, has a co-worker been injured at work? (Y/N)".

Sociodemographics

Demographic variables included gender, race (white, black, Hispanic and others), age and location of school district. The locations of the school districts were divided into four categories as defined by the Wisconsin Department of Public Instruction: rural, small town, medium city and large city.

Statistical methods

Teens who responded to the questionnaire were classified into one of three groups based on whether: (1) the teen was not employed (non-working), (2) the teen was enrolled in a SSW program (SSW teens) or (3) the teen was employed but not enrolled in a SSW program (other-working teens). Data from 6519 questionnaires meeting the following two exclusion criteria were used: (1) age <14 or age >18 and (2) missing or invalid group data. After applying the exclusion criteria and only considering working teens, the data consisted of 461 SSW teens and 2950 other-working teens. These working groups were stratified by the number of jobs held (1 job vs >1 jobs).

Demographic characteristics and work characteristics were summarised by working group (SSW vs other-working) and by the number of jobs held. Frequency counts and percentages were calculated for the two working groups. Next, univariate ORs were estimated using logistic regression models to assess the association between the working groups and the outcomes in this study.

Finally, for each outcome, a separate multivariable logistic regression model adjusting for covariates influencing the OR estimate of the working groups was fit using the forward selection process. This method was used to fit the most parsimonious models; that is, we started with the base model including working groups and in a forward fashion included only predictors that improved model fit via the likelihood ratio test. The covariates investigated included demographic characteristics, working group characteristics, possible confounding factors such as had a near miss incident or performed a dangerous task, and any first-order interactions. All statistical analyses were performed using SAS 9.2. All statistical tests were made at the α=0.05 level.

RESULTS

Overall, 3411 high school teens aged 14–18 years reported that they were working when they completed the questionnaire; 461 of these were enrolled in SSW programs and 2950 were not enrolled in SSW programs. Of the 461 teens in the SSW group, 250 (54%) held only the SSW job and 204 (44%) held multiple jobs. Of the 2950 teens in the other-working group, 1938 (66%) held only one job and 970 (33%) held multiple jobs.

Teens who worked one job

Table 1 presents the demographic data and some work characteristics for teens who worked one job.

Among teens holding only one job, those enrolled in SSW programs were more likely to be 17 years or older (64% vs 38%) and be either black or Hispanic (24% vs 13%) when compared to other-working teens. SSW teens were more likely to work before 8:00 h on 2 or more days (23% vs 14%) per week and to work 11 or more hours per week (66% vs 49%) compared to the other-working teens. No differences in gender, type of school district or how late they worked were observed between the SSW teens and other-working teens. Furthermore, there were no significant differences between SSW teens and other-working teens regarding being injured (14% vs 11%) or severely injured (33% vs 22%) at work.

Table 2 list the jobs and tasks that teens reported carrying out. For SSW teens the top job tasks were cashier/waitperson, cleaning tables/floors/rooms and childcare. Other-working teens reported carrying out the same top job tasks.

The 36 SSW teens who were injured reported 60 injuries. The most common injuries were cuts (33%), burns (22%) and bruises (13%). Broken bones, crushed body parts and sprained muscles accounted for 13% of the reported injuries. The majority of the 36 injured SSW teens were injured by contact with hot grease or fluids (23%), contact with a knife or sharp object (19%) and falls from ladders, stairs or flat surfaces (17%).

The 218 other-working teens who were injured reported 420 injuries. The most common injuries for this group were cuts (27%), burns (20%) and bruises (15%). Broken bones, crushed body parts and sprained muscles accounted for 13% of the reported injuries. The majority of the 218 injured other-working teens were injured by contact with hot grease or fluids (19%), contact with a knife or sharp object (17%) and falls from ladders, stairs or flat surfaces (15%).

Table 3 presents the univariate and multivariable ORs and 95% CIs for the outcome variables of interest for teens with one job. Univariate ORs of teens 'injured at work' was highest among the SSW teens; however, these odds were not statistically significant at the 5% level (OR 1.37; 95% CI 0.94 to 2.01). The most parsimonious model for predicting whether or not a teen would be injured at work included factors such as race/ethnicity, having a near miss incident and performing a dangerous task, which attenuated the OR for SSW teen to 0.97 (95% CI 0.61 to 1.55), clearly indicating no difference in injury between SSW teens and other-working teens who work one job. Severe injury comparisons between SSW teens and other-working teens did not reach statistical significance at the 5% level.

Compared with other-working teens, SSW teens were significantly more likely to be informed of their legal rights (AOR 1.57; 95% CI 1.04 to 2.36) and receive safety training (AOR 1.48; 95% CI 1.06 to 2.08).

Teens who worked multiple jobs

Table 1 presents the demographic data and some work characteristics for teens who worked multiple jobs. Among teens holding multiple jobs, those enrolled in SSW programs were more likely to be 17 years or older (68% vs 37%) when compared to other-working teens. SSW teens were also more likely to work

Table 1 Demographic and working characteristics of working teens

Characteristic	Levels	Teens with one job		Teens with multiple jobs	
		SSW (N=250)	Other working (N=1938)	SSW (N=204)	Other working (N=970)
Type of school district	Rural	19 (8%)	222 (11%)	26 (13%)	103 (11%)
	Small town	12 (5%)	106 (5%)	10 (5%)	63 (6%)
	Medium city	197 (79%)	1473 (76%)	154 (75%)	737 (76%)
	Large city	22 (9%)	137 (7%)	14 (7%)	67 (7%)
Age	14	8 (3%)	127 (7%)	7 (3%)	50 (5%)
	15	31 (12%)	533 (28%)	17 (8%)	273 (28%)
	16	49 (20%)	543 (28%)	42 (21%)	284 (29%)
	17	86 (34%)	476 (25%)	67 (33%)	227 (23%)
	18	76 (30%)	259 (13%)	71 (35%)	136 (14%)
Gender	…	2 (1%)	14 (1%)	2 (1%)	5 (1%)
	Male	109 (44%)	811 (42%)	91 (45%	422 (44%)
	Female	139 (56%)	1113 (57%)	111 (54%)	543 (56%)
Race/ethnicity	…	3 (1%)	11 (1%)	7 (3%)	4 (0%)
	White	161 (64%)	1433 (74%)	140 (69%)	726 (75%)
	Black	43 (17%)	161 (8%)	17 (8%)	63 (6%)
	Hispanic	17 (7%)	100 (5%)	12 (6%)	65 (7%)
	Others	26 (10%)	233 (12%)	28 (14%)	112 (12%)
How late teen worked	…	30 (12%)	136 (7%)	15 (7%)	58 (6%)
	Before 19:00 h	95 (38%)	701 (36%)	63 (31%)	286 (29%)
	Between 19:00 and 23:00 h	116 (46%)	1058 (55%)	108 (53%)	571 (59%)
	After 23:00 h	9 (4%)	43 (2%)	18 (9%)	55 (6%)
How often teen worked before 8:00 h	…	21 (8%)	118 (6%)	13 (6%)	54 (6%)
	Never	156 (62%)	1419 (73%)	120 (59%)	636 (66%)
	1 day	15 (6%)	124 (6%)	16 (8%)	91 (9%)
	2 or more days	58 (23%)	277 (14%)	55 (27%)	189 (19%)
Hours per week worked	…	2 (1%)	54 (3%)	0 (0%)	32 (3%)
	Less than 5	38 (15%)	460 (24%)	31 (15%)	185 (19%)
	6–10	44 (18%)	475 (25%)	33 (16%)	225 (23%)
	11–16	59 (24%)	378 (20%)	36 (18%)	178 (18%)
	17–22	56 (22%)	345 (18%)	44 (22%)	154 (16%)
	23 or more	51 (20%)	226 (12%)	60 (29%)	196 (20%)
	…	16 (6%)	75 (4%)	7 (3%)	32 (3%)
Injured at work	Yes	36 (14%)	218 (11%)	53 (26%)	161 (17%)
	No	198 (79%)	1645 (85%)	144 (71%)	777 (80%)
	…	1 (3%)	11 (5%)	3 (6%)	8 (5%)
Severe injury	Yes	12 (33%)	48 (22%)	20 (38%)	44 (27%)
	No	23 (64%)	159 (73%)	30 (57%)	109 (68%)

SSW, school-sponsored work.

before 8:00 h for 2 or more days per week (27% vs 19%) and work 17 or more hours per week (51% vs 36%) compared with other-working teens. No differences in gender, type of school district, race/ethnicity or how late they worked were observed between the SSW teens and other-working teens. Table 2 presents the jobs and tasks that teens reported carrying out. For both SSW teens and other-working teens, the top three jobs/tasks were cashier/waitperson, babysitting/childcare and cleaning tables/floors/rooms.

A significant difference regarding teens who were injured at work was found between SSW and other-working teens (26% vs 17%). The 53 SSW teens who were injured reported 108 injuries. The most common injuries reported were the same as those reported in the single job group. However, there was a much higher percentage of reported broken bones, crushed body parts and sprained muscles in the SSW teens who held multiple jobs compared to the SSW teens who worked only one job (25% vs 13%). The majority of the 53 injured SSW teens were injured by falls from ladders, stairs and flat surfaces (17%), contact with hot grease or fluids (12%) and carrying or lifting an object (11%).

The 161 other-working teens who were injured reported 367 injuries. The most common injuries for this group were the same as for the single job other-working teens: cuts, burns and bruises. However, broken bones, crushed body parts and sprained muscles accounted for 20% of the reported injuries. The majority of the 161 injured other-working teens were injured by falls from ladders, stairs or flat surfaces (19%), contact with a knife or sharp object (15%) and contact with hot fluid or grease (13%).

Table 4 presents the univariate and multivariable ORs and 95% CIs for the outcome variables of interest for teens working multiple jobs. Univariate ORs of teens 'injured at work' were highest among the SSW group (OR 1.78; 95% CI 1.24 to 2.54). The most parsimonious model for predicting whether or not a teen would be injured at work included factors such as how late the teen worked, having a near miss incident and performing a dangerous task, which attenuated the OR for SSW to 1.21 (95% CI 0.77 to 1.91). The univariate OR for teens being severely injured at work was not significant (OR 1.60; 95% CI 0.82 to 3.10). When covariates were included in the logistic

Table 2 Tasks reported by SSW teens and other-working teens stratified by number of jobs*

	SSW teens				Other-working teens			
	Worked 1 job (N=250)		Worked >1 job (N=204)		Worked 1 job (N=1938)		Worked >1 job (N=970)	
Type(s) of jobs and tasks	N	%	N	%	N	%	N	%
Animal care	11	4.4	18	8.8	130	6.7	126	13.0
Harvesting/planting	6	2.4	11	5.4	69	3.6	68	7.0
Babysitting/child care	56	22.4	63	30.9	623	32.1	452	46.6
Cashier/waitperson	84	33.6	82	40.2	658	34.0	336	34.6
Dishwashing	40	16.0	40	19.6	392	20.2	222	22.9
Sales person	29	11.6	48	23.5	200	10.3	157	16.2
Cleaning tables/floors/rooms	57	22.8	61	29.9	555	28.6	326	33.6
Stocking shelves	41	16.4	56	27.5	388	20.0	223	23.0
Cooking/frying	39	15.6	38	18.6	271	14.0	155	16.0
Other food preparation (not cooking or frying)	34	13.6	36	17.6	351	18.1	188	19.4
Department store	19	7.6	26	12.7	124	6.4	81	8.4
Tree/shrub trimming or cutting	2	0.8	11	5.4	64	3.3	83	8.6
Hardware store	5	2.0	11	5.4	22	1.1	26	2.7
Carpentry	8	3.2	18	8.8	50	2.6	64	6.6
Gas station	1	0.4	8	3.9	16	0.8	27	2.8
Construction	5	2.0	19	9.3	53	2.7	60	6.2
Lawn mowing	15	6.0	21	10.3	210	10.8	232	23.9
Roofing	6	2.4	17	8.3	47	2.4	70	7.2
Painting	11	4.4	17	8.3	98	5.1	118	12.2
Manufacturing	4	1.6	9	4.4	9	0.5	15	1.5
Lumber yard	–	–	7	3.4	10	0.5	15	1.5
Hospital/nursing home/clinic	19	7.6	15	7.4	45	2.3	35	3.6
Nursing assistant/working with patients	16	6.4	16	7.8	30	1.5	28	2.9
Hotel/motel/resort	11	4.4	13	6.4	39	2.0	36	3.7
Newspaper/magazine delivery	2	0.8	7	3.4	47	2.4	45	4.6
Office assistant/receptionist	22	8.8	26	12.7	53	2.7	57	5.9
Driver/courier/delivery person (not newspaper/magazine delivery)	7	2.8	10	4.9	29	1.5	28	2.9
Other	43	17.2	40	19.6	302	15.6	183	18.9

*Teens could select multiple jobs/tasks.
SSW, school-sponsored work.

model, teens enrolled in the SSW programs were 3.5 times more likely to report a severe injury than other-working teens (AOR 3.49; 95% CI 1.52 to 8.02). Table 5 presents the factors associated with severe injury in teens working one job and teens working multiple jobs and reports the elevated adjusted OR for teens enrolled in SSW programs.

As displayed in table 4, compared with other-working teens, SSW teens were significantly more likely to be informed of their legal rights (AOR 1.77; 95% CI 1.16 to 2.70) and receive safety training (AOR 1.47; 95% CI 1.01 to 2.14). However, SSW teens were also significantly more likely to have a near miss incident and report carrying out a dangerous task.

Table 3 Estimates of univariate and multivariable adjusted ORs for teens working only one job

Outcomes	SSW: other-working, OR_{unadj} (95% CI)	SSW: other-working, OR_{adj} (95% CI)*
Injured at work	1.37 (0.94 to 2.01)	0.97 (0.61 to 1.55)
Severely injured at work	1.74 (0.81 to 3.75)	1.64 (0.68 to 3.94)
Informed of legal rights and responsibilities	2.01 (1.39 to 2.91)	1.57 (1.04 to 2.36)
Received safety training	1.59 (1.17 to 2.15)	1.48 (1.06 to 2.08)
Performed a dangerous task	1.59 (0.96 to 2.66)	1.51 (0.85 to 2.68)
Had a near miss incident	1.77 (1.21 to 2.60)	1.67 (1.10 to 2.54)
Co-worker injured at work	1.35 (0.99 to 1.84)	1.02 (0.72 to 1.44)
Filed for workers compensation	1.87 (0.80 to 4.37)	1.60 (0.63 to 4.04)

*The most parsimonious models were fit for each outcome variable. The covariates investigated included demographic characteristics, working group characteristics, possible confounding factors such as had a near miss incident or performed à dangerous task, and any first-order interactions.
SSW, school-sponsored work.

DISCUSSION

SSW programs were created to prepare youth for transition into the workforce upon graduating from high school. These programs combine school-based activities with work-based activities so that youth are equipped with the skills necessary to succeed in the workplace. Since the STWOA was based on the apprenticeship model, where teens could learn job skills while under the guidance of a mentor, we expected that fewer work-related injuries would occur among SSW teens compared with other-working teens. When we compared teens who only worked in SSW jobs to other-working teens who worked one job, there was no difference in injury between the two groups. Ideally, since SSW programs are based on apprenticeship models, with guidance and training, we would have liked to have seen a protective effect for teens in SSW programs, in other words, statistically less injury among SSW teens compared to other-working teens.

This study did find that SSW teens who work multiple jobs are more likely to suffer a severe injury compared to other-working teens who work multiple jobs. Possible explanations for this are based on the analysis of the other outcome variables

Table 4 Estimates of univariate and multivariable adjusted ORs for teens working multiple jobs

Outcomes	SSW: other-working, OR_{unadj} (95% CI)	SSW: other-working, OR_{adj} (95% CI)*
Injured at work	1.78 (1.24 to 2.52)	1.21 (0.77 to 1.91)
Severely injured at work	1.60 (0.82 to 3.10)	3.49 (1.52 to 8.02)
Informed of legal rights and responsibilities	1.68 (1.16 to 2.44)	1.77 (1.16 to 2.70)
Received safety training	1.55 (1.10 to 2.18)	1.47 (1.01 to 2.14)
Performed a dangerous task	2.00 (1.28 to 3.13)	1.80 (1.07 to 3.02)
Had a near miss incident	2.01 (1.39 to 2.91)	1.83 (1.22 to 2.76)
Co-worker injured at work	1.73 (1.25 to 2.39)	1.37 (0.95 to 1.98)
Filed for workers compensation	1.72 (0.80 to 3.67)	1.72 (0.80 to 3.67)

*The most parsimonious models were fit for each outcome variable. The covariates investigated included demographic characteristics, working group characteristics, possible confounding factors such as had a near miss incident or performed a dangerous task, and any first-order interactions.
SSW, school-sponsored work.

where SSW teens with multiple jobs are more likely to be asked to do a dangerous task compared to other-working teens (AOR 1.80; 95% CI 1.07 to 3.02) and to have a near miss incident compared with other-working teens (AOR 1.83; 95% CI 1.22 to 2.76). Results comparing the work profile of SSW teens with multiple jobs and other-working teens with multiple jobs shed some light on why SSW teens may be engaging in more dangerous tasks. The profiles of jobs and tasks show some slight differences in jobs that might be considered more hazardous such as construction (9.3% SSW vs 6.2% other-working), lumberyard (3.4% SSW vs 1.5% other-working), manufacturing (4.4% SSW vs 1.5% other-working), roofing (8.3% SSW vs 7.2% other-working), carpentry (8.8% SSW vs 6.6% other-working), hospital/nursing home/clinic (7.4% SSW vs 3.6% other-working), nursing assistant/working with patients (7.8% SSW vs 2.9% other-working) and driver/courier/delivery person (4.9% SSW vs 2.9% other-working).

An additional explanation why SSW teens are more likely to be severely injured compared to other-working teens is that some characteristics of their work may be indicative of more workplace risk, such as working more hours per week and working before school. Overall, 30% of the SSW teens who worked multiple jobs worked hours equivalent to a part time job and 7% worked over 40 h per week. In comparison, only 3% of other-working teens reported working over 40 h per week. Additionally, 27% of SSW teens reported working before 8:00 h on 2 or more days per week compared to 19% of other-working teens. The combined stress of fulfilling school requirements and working many hours at multiple jobs may cause exhaustion which could impair judgment and agility in these young workers.

Table 5 Factors associated with severe injury in teens working one job and teens working multiple jobs*

	One job		Multiple jobs	
Characteristic	**Crude OR (95% CI)**	**Adjusted OR (95% CI)**	**Crude OR (95% CI)**	**Adjusted OR (95% CI)**
Working group				
SSW	1.74 (0.81 to 3.75)	1.64 (0.68 to 3.94)	1.60 (0.82 to 3.10)	3.49 (1.52 to 8.02)
Other-working	Referent	Referent	Referent	Referent
Gender				
Male	3.58 (1.86 to 6.88)	3.32 (1.66 to 6.65)	2.17 (1.15 to 4.08)	
Female	Referent	Referent	Referent	NA
Race				
Black	2.66 (1.22 to 5.80)		3.40 (1.32 to 8.75)	
Hispanic	1.36 (0.46 to 4.03)		1.81 (0.66 to 4.97)	
Others	1.20 (0.44 to 3.23)		2.18 (0.94 to 5.06)	
White	Referent	NA	Referent	NA
Age (years)				
14	2.82 (0.75 to 10.6)		0.25 (0.03 to 2.32)	
15	2.67 (0.92 to 7.71)		0.72 (0.30 to 1.71)	
16	1.94 (0.69 to 5.42)		0.35 (0.15 to 0.83)	
17	1.17 (0.41 to 3.33)		0.49 (0.21 to 1.11)	
18	Referent	NA	Referent	NA
Hours per week worked				
23 or more	0.86 (0.33 to 2.21)		4.12 (1.27 to 13.3)	
17–22	0.64 (0.23 to 1.74)		0.98 (0.25 to 3.91)	
11–16	0.81 (0.31 to 2.13)		2.25 (0.60 to 8.46)	
6–10	0.43 (0.15 to 1.24)		2.44 (0.70 to 8.55)	
Less than 5	Referent	NA	Referent	NA
How late worked				
After 23:00 h	5.18 (1.49 to 17.9)	4.80 (1.26 to 18.3)	26.0 (7.52 to 89.9)	43.8 (11.2 to 172)
Between 19:00 and 23:00 h	0.87 (0.45 to 1.71)	1.01 (0.49 to 2.06)	2.26 (0.88 to 5.84)	2.94 (1.01 to 8.57)
Before 19:00 h	Referent	NA	Referent	NA
Days worked before 8:00 h				
2 or more days	1.93 (0.95 to 3.90)		3.08 (1.57 to 6.04)	
1 day	1.99 (0.70 to 5.67)		1.56 (0.61 to 4.02)	
Never	Referent	NA	Referent	NA

*The table lists the factors entered in the multivariable logistic regression model using the forward selection method for determining the best fitting or most parsimonious model. The adjusted ORs are based on the final model with those factors that remained in the model after forward selection.
SSW, school-sponsored work.

One further explanation for the difference in severe injury between SSW teens and other-working teens could be the racial variation between the groups. Overall, more minorities were enrolled in SSW programs. The role of race and ethnicity in occupational injury and illness is complex. Studies of adult workers have produced conflicting results as to whether non-white workers are at greater risk for occupational injury and illness.[20–29] Similarly, the studies on the role of race/ethnicity in work-related injury among teen workers are limited and have also produced a conflicting picture. One study reported that being non-white is associated with more work-related injury,[30] while another study did not find that race/ethnicity was related to more injury, although it did find that non-white subjects needed more time to recover from their injuries.[20] Race is a possible proxy for other characteristics such as differences in hazardous tasks, shift work and training, that may in fact predict work-related injury; these issues deserve further investigation to tease out this complex relationship.

The effects of occupational injuries can be profound. It has been estimated that work-related injuries among teens cost US$5 billion annually, which is probably underestimated as it was based on national survey data that may have omitted certain ages and populations.[31] In addition to the economic toll, the effects of work-related injury can be devastating to the development of a teen. For example, teens who suffer musculoskeletal injuries can have permanent disability and pain or they can suffer traumatic injuries that can affect physical and emotional health.

Unlike after-school jobs that many teens work for spending money, the SSW program is a program that involves teens working in jobs as part of a career path. Training must start early and be frequent. In the Wisconsin Work-Based Learning Guide, the roles of students and employers in the Youth Apprenticeship Program are clearly laid out. For employers, for example, it is mandated that they abide by federal child labour laws, ensure that any work performed under the label of hazardous occupation is under the direct and close supervision of a qualified and experienced person, ensure that the work of a youth apprentice, or any other student learner, in any occupation labelled as hazardous is periodic and of short duration, and ensure that all safety instruction are provided to and understood by the youth apprentice.[32] While we would expect that SSW programs would include proper safety and health training and workplace supervision, it is unknown what teens enrolled in the program are receiving and the effectiveness of the training and supervision. This study did show that students in the SSW program were slightly more likely to report having received safety training and having being informed of their legal rights compared with other-working teens.

There are a few limitations to this study which need to be addressed. One of the main limitations of the data is that we can not specifically determine what jobs or tasks were associated with an injury. During the survey, students selected multiple tasks associated with their jobs and there is no way to determine which task led to injury. However, we can evaluate the job tasks and compare the profiles to establish if the work SSW teens were doing differed greatly from that of other-working teens. Another limitation of the study could be selection bias. The study was conducted in one state which may have some SSW programs that are not available in other regions of the country.

SSW programs aim to create a well-trained workforce; however, there should be an assurance that this workforce is trained in occupational safety and health, as well as job duties. This first study, conducted in one state, suggests that students in SSW programs are no more likely to be injured at work than other students, provided that they work one job only. However, when students work multiple jobs, those teens enrolled in the SSW programs are more likely to be severely injured; possible explanations have been provided. More research and evaluation regarding SSW programs needs to be conducted to determine what teens are learning on the job, what safety skills they are being taught, and what effect working long hours combined with academic requirements has on teen safety and health.

Funding The National Institute for Occupational Safety and Health/Centers for Disease Control and Prevention provided funding for this study.

Competing interest None.

Ethics approval This study was conducted with the approval of the University of Louisville.

Provenance and peer review Not commissioned; externally peer reviewed.

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