Health Risk Behaviors and Work Injury among Hispanic Adolescents and Farmworkers

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ABSTRACT. *Adolescents may engage in health risk behaviors that increase their likelihood of injury. Employment places adolescents at risk of work-related injuries. This study responds to the paucity of data on the relationship between adolescent health risk behaviors and work-related injury. This cross-sectional study included the administration of anonymous surveys to ninth graders (n = 4,914) who attended high schools in south Texas. An aggregate risk score (ARS) was developed based on health risk behaviors. The ARS was analyzed as an outcome using linear regression. Associations between health risk behaviors and work-related injury were assessed with logistic regression. Of the respondents, 19% reported they had a job, and 14% reported that they had been employed in farmwork. Farmwork-related injury was reported by 9% of adolescents, and 12% reported other work-related injury. Mean ARS scores were significantly higher ($p < 0.05$) for both male and female adolescents who reported a work-related injury compared to nonworking adolescents, and for males who had done migrant farmwork compared to all other adolescent males. The ARS increased as hours worked per week increased. After controlling for confounding factors, a statistically significant association was found between ARS and non-farmwork, work-related injury, but not between ARS and farmwork-related injury. Farmworkers with high ARS were more likely to report non-farmwork, work-related injuries. The predictors of work-related injury in the adolescent groups, particularly for farmworkers and migrants who are under additional stress, remain an important occupational health area to be addressed.*

Keywords. *Adolescents, Farmworkers, Health Risk Behaviors, Hispanic, Injury, Migrants, Texas.*

There is a paucity of research focused on adolescent farmworkers, even though about 6% of the farmworker workforce in the U.S. in 2000 was 14 to 17 years old (Carroll et al., 2005). Working conditions experienced by adolescent farmworkers are characterized by weak regulatory protection, lack of compliance with existing regulations, and gaps in service provision (Cooper et al., 2005b). Adolescents are especially

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vulnerable to adverse health effects from agricultural exposures due to the rapid growth and development experienced during adolescence (Golub, 2000). Specific agricultural work tasks have been identified that are more likely to contribute to musculoskeletal injury among adolescents (Allread et al., 2004). Ergonomic, chemical, and physical hazards in agriculture, along with the stress of learning new skills in unfamiliar environments, are all risk factors for adolescent injury (Feldman et al., 2002). In the year 2000, the Lower Rio Grande Valley (LRGV) accounted for about 27% (estimated to be 98,934) of the total Texas farmworker population (Larson, 2000). Recent studies have investigated employment during the school year among adolescents in south Texas and reported the odds of sustaining a work-related injury to be the highest for those working in agriculture, with those odds increasing significantly as the number of hours worked per week increase (Weller et al., 2003a; Weller et al., 2003b). The effect of agricultural labor on the health and well-being of adolescent farmworkers has not been well described.

Risks faced by adolescent farmworkers extend beyond the agricultural work environment. Adolescent farmworkers tend to be Hispanic and economically disadvantaged (Carroll et al., 2005). Therefore, they face factors that contribute to health disparities, including language and cultural barriers, lack of access to preventive care, and lack of health insurance (U.S. Commission on Civil Rights, 1999; Fronstin, 2000). Lower education and higher poverty levels among Hispanics, along with family disruption and weak intergenerational ties caused by migration, have been shown to increase risk for violent behavior (Koplan and Binder, 2001). Migrant children have been shown to be significantly more likely to be maltreated than other children (Larson et al., 1990). Migrant adolescent farmworkers have been described to be at greater risk for substance use and work-related injury than nonmigrant adolescents (Cooper et al., 2005a). Although it is difficult to assess the effect occupational, economic, and social issues have on adolescent farmworker health, safety health professionals must do so in order to protect this vulnerable population.

Socioeconomic deprivation and health risk behaviors have been associated with adverse acute and chronic health conditions among adolescents (Melzer-Lange, 1998; Weller et al., 1999; Fleschler et al., 2002; Wardle et al., 2003; Cooper et al., 2005a). In 2001, the leading causes of morbidity and mortality among people aged 10 to 24 in the U.S. were associated with health risk behaviors (Arias, 2002). Results from the 2003 national Youth Risk Behavior Survey (YRBS) demonstrated that the majority of risk behaviors associated with cardiovascular diseases and cancer are initiated during adolescence (Eaton et al., 2006a). In 2005, the national YRBS reported high school students engaged in behaviors that increased their likelihood of dying from motor-vehicle crashes, unintentional injuries, homicide, and suicide (Eaton et al., 2006b). A total of 23.0% of high school students had smoked cigarettes during the 30 days preceding the survey, 67.0% did not attend physical education classes, 44.9% had drunk alcohol, 20.2% had used marijuana, and 46.8% of high school students had ever had sexual intercourse. In addition, during the 12 months preceding the survey, 35.9% of high school students had been in a physical fight (Eaton et al., 2006b).

Lower socio-economic status has been associated with adolescent health risk behaviors (Langille et al., 2003; Langille et al., 2005). Several studies reported that youth working at a job for pay during school appeared to have an increased risk for substance use, including decreased physical activity (Valois et al., 1999; Carriere, 2005; Howteerakul et al., 2005; Wakai et al., 2005). Increasing hours worked per week was associated with increased risky health behaviors and psychological stress among adolescents in south Texas (Weller et al., 2003c). A significant association between nonfatal occupational injuries and self-reported substance use has been reported among high school students in south Texas (Shipp et al., 2005). Migrant adolescents in south Texas are more

likely to report frequent substance use and more likely to have been injured while working than nonmigrant students (Cooper et al., 2005a). Little is known about the association between health risk behaviors and work-related injury among adolescent farmworkers.

This is among the first studies to investigate the association between health risk behaviors and work-related injury among adolescent, primarily Hispanic, farmworkers. The purpose of this study was to determine if health risk behaviors were associated with work-related injury and specifically if they were associated with farmwork-related injury. Study results were based on an anonymous survey that assessed self-reported health risk behaviors and injury experience.

Materials and Methods

Study Population

The Lower Rio Grande Valley (LRGV), located on the Texas-Mexico border near the Gulf of Mexico, consists of the four southernmost counties (Cameron, Hidalgo, Starr, and Willacy) in Texas. During the 2000-2001 school year, there were 40 high schools in the LRGV, with more than 50 ninth-grade students each, and the total enrollment was over 21,500 students in the ninth grade. A stratified, two-stage cluster sampling design was adopted, with school districts considered primary sampling units and high schools considered secondary sampling units. There were eight school districts in Cameron, 13 in Hidalgo, two in Starr, and one in Willacy. In stage one, the districts were randomly sampled with selection probability of enrollment. Four districts were sampled in Cameron, three districts were sampled in Hidalgo, and all districts were included in the sample from Starr and Willacy counties. In stage two, high schools were selected from the qualified districts. A total of 42 schools with less than 50 ninth graders were excluded from the sampling frame to limit the cost of survey administration. It is unlikely that the exclusion of these schools resulted in a biased sample because the total number of students excluded was less than 8% (n = 607) of those sampled. If there were three or more high schools in a district, two of the schools were randomly selected for study inclusion. If there were one or two high schools in a district, all were included in the sample. Eighteen high schools, with a combined total of 7,642 ninth graders enrolled, met the second stage selection criteria and were invited to participate in the study. Thirteen of the 18 high schools (72%), with a total of 5,118 ninth-grade students, agreed to participate. Nonparticipating and participating schools differed with respect to proportion of Hispanics (88% vs. 96%, respectively, $p = 0.03$), but not with respect to English proficiency, proportion of economically disadvantaged, at risk, gifted and talented, and dropout students (each at or $p > 0.05$) (Texas Education Agency, 2006).

The 5,118 potential participants in the study represented 24% of ninth-grade students in the LRGV. The final number of usable surveys was 4,914 subjects (96% completed the survey), representing 22.9% of ninth-grade students in the LRGV. Reasons for individual non-participation were tardiness, absenteeism, and parental or student refusal. Two hundred and four (204, or 4%) surveys were deemed unusable because respondents did not indicate gender, were not yet 14 years of age, or did not respond to at least 75% of the questions. An overall participation rate of 48% was calculated by multiplying the high school response rate (72%) by the student response rate (67%). This study was approved by The University of Texas Health Science Center at Houston's Committee for the Protection of Human Subjects. School districts obtained parental permission prior to conducting the survey, which was administered during regularly scheduled classes. Students could refuse to participate for any reason.

Description of Survey

The Youth Risk Behavior Surveillance System (YRBSS) was developed in 1989 by the Centers for Disease Control and Prevention to study priority health risk behaviors that contribute to leading causes of mortality, morbidity, and social problems among youth in the U.S. (Kann, 2001). The YRBS is a population-based survey administered in school settings to students in grades 9 to 12 (Kolbe et al., 1993). There was satisfactory test-retest reliability of the 1999 YRBS instrument (Brener et al., 2002). The YRBS monitors six categories of priority health-risk behaviors among youth and young adults: behaviors that contribute to unintentional injuries and violence (kappa = 59.9; CI: 55.7, 64.3), tobacco use (kappa = 68.8; CI: 64.9, 72.7), alcohol and other drug use (kappa = 63.4; CI: 58.8, 68.0), sexual behaviors that contribute to unintended pregnancy and sexually transmitted diseases (STDs) including human immunodeficiency virus (HIV) infection (kappa = 62.7; CI: 59.6, 65.7), unhealthy dietary behaviors (kappa = 50.0; CI: 46.5, 53.5), and physical inactivity (kappa = 55.2, CI: 52.3, 58.1) and being overweight (Grunbaum et al., 2002a). Most of the survey questions for this study were drawn from the YRBS because it has been widely used and covers a broad range of important risk behaviors.

Measures

Seventy-six of the 93 questions for the Texas Youth Risk Behavior Survey (TYRBS) used in this study were taken directly from the national YRBS (Grunbaum et al., 2002b). The categories used in the TYRBS included: substance use (tobacco, alcohol and other drug use), sexual behaviors (lifetime number of sex partners and age at first intercourse), engagement in a physical fight, perceived level of emotional well-being (mental/emotional health), and physical activity (refer to the Appendix). Seventeen additional questions were added to ascertain birthplace, language use, selected beliefs regarding ethnicity, perceptions regarding discrimination, degree of depression, level of anxiety, existence of sleep problems, marital status, perceived socioeconomic status, and performance of farmwork or other work.

Farmwork-related questions were asked as follows: “Have you done farmwork (like picking or packing fruits or vegetables, or doing other work in the fields)?” Response categories were: “Yes, I have done farmwork while living at home”; “Yes, I have traveled away from home for part of the year to do farmwork”; and “No, I have never done farmwork.”

The question addressing farmwork-related injury was: “Have you ever been hurt while doing farmwork?” Response categories were: “I have never done farmwork”; “Yes, I got hurt doing farmwork but did NOT need to go to a doctor, nurse, or hospital”; “Yes, I got hurt doing farmwork and I DID go to a doctor, nurse, or hospital”; and “No, I have never been hurt doing farmwork.”

The question addressing non-farmwork work-related injury was: “Thinking about all the jobs you may have had OTHER than farmwork, did you ever get hurt while working?” Response categories were: “Never worked in one of these jobs”; “Yes, I got hurt doing a job that was not in farmwork but did NOT need to go to a doctor, nurse, or hospital”; Yes, I got hurt doing a job that was not in farmwork and I DID go to a doctor, nurse, or hospital”; and “No, I have never been hurt while doing one of these jobs.”

The question addressing work experience read: “Do you currently have a job or have you had a job this school year? If yes, about how many hours do you work or did you work per week?” The survey consisted of 93 questions that were answered in about 40 minutes. Results from this same survey and study population regarding dating violence and insomnia have been already been published (Sanderson et al., 2004; Roberts et al., 2004).

Aggregate Risk Score

Following the methods recommended by Streiner and Norman (2003), an aggregate risk score (ARS) was developed for this study and calculated for each participant. Fifteen questions were used to develop the ARS, and they are presented in the Appendix. The Appendix shows the constructs, questions used to ascertain status, response categories, variable scores, variable weight, and minimum and maximum construct score observed. The last row in the Appendix shows the minimum and maximum weighted sum of the seven constructs. Questions were grouped into seven constructs. A high score represents a higher risk for each construct. Each construct had different metrics, making any comparison among them difficult. The sum of the seven constructs had a minimum value of 16 points and a maximum value of 96 points without weighting. To account for the different metrics and to facilitate interpretation of an overall score, each variable was weighted by multiplying its score response by its variable weight. For example, the weighted minimum and maximum for the first question of tobacco use are 0.5 and 3 points. The overall ARS was computed by transforming the sum to percentiles (where seven was scaled to zero, and 44 was scaled to 100). As a result, a high overall ARS indicated a high level of engagement in health risk behaviors. The ARS was used to calculate the tertiles for risks, with cutoff points for the tertiles computed separately by gender. Internal consistency of the variables included in the ARS was calculated using standardized Cronbach's coefficient alpha ($\alpha = 0.87$). The overall standardized Cronbach's coefficient alpha at 0.87 provides an acceptable lower bond for the internal consistency of the ARS (Nunnally and Bernstein, 1994).

Data Analysis

Probability sampling weights were applied to each sample to reflect the total population of ninth graders in the LRGV. Sampling weights were derived as the inverse of the probability of subject selection with no adjustment for non-response. Data were analyzed using Survey Data Analysis and SUDAAN (Release 8.01) to account for the complex survey design (Shah et al., 2002).

Associations between the ARS and work-related variables were examined. The dependent variable was a history of injury while working in a farmwork or non-farmwork setting. Working hours during the school year were collapsed into four categories: nonworker, 1 to 10 hours per week, 11 to 20 hours per week, and more than 20 hours per week. Multivariable linear regression with ARS as the dependent (continuous) variable was used to determine whether mean ARS differed significantly by each of the work-related variables while accounting for effect modification and confounding. Multivariable logistic regression with farmwork-related injury and non-farmwork, work-related injury as the dependent (dichotomous) variables was used to determine whether tertiles of ARS were associated with injury status. Variables considered as confounders of the associations between risk behaviors (ARS) and work were age, marital status, and family living standard. Continuous response options were grouped into categories of work hours per week, as listed in table 2, and table 3 presents the categories for intensity of risk behaviors based on the original YRBS questions. The criteria used to identify confounding were based on a 10% change between crude and adjusted estimates (Rothman and Greenland, 1998) for at least one of the four work-related variables. Although there was no evidence of statistical effect modification of these associations by gender, analyses are presented separately for females and males since the effect of work on risky behaviors is thought to differ by gender.

Results

Ninety-four percent (94%) of the student respondents were Hispanic. Seventy-five percent (75%) were Mexican-Americans born in the U.S. Nineteen percent (19%) had a job during the current school year, and over 25% of those who worked did so for more than 20 hours per week. About 1 in 7 (14%) of the students reported they had done farmwork, and about 1 in 10 (10%) traveled away to do farmwork.

The weighted prevalence of work characteristics among adolescents in the LRGV is presented in table 1. More male adolescents reported having done farmwork locally (21%) than females (8%), and more males (14%) than females (7%) traveled away for part of the year to do farmwork. Reported working hours per week were higher among males than females, with 7% of males working 20 or more hours per week compared to 3% of females. Work-related injuries were three times more frequent among adolescent males (farmwork 12%, non-farmwork 19%) than among females (farmwork 4%, non--farmwork 6%).

The distributions of health risk behaviors are shown in table 2. Adolescent males reported more health risk behaviors than females for smoking, drinking, drug use, lifetime number of sex partners, younger age at first intercourse, and number of times in a physical fight.

Table 1. Distribution of work characteristics by gender among Hispanic adolescents.

	Female (n = 2460)		Male (n = 2454)	
Variable	n	Weighted %	n	Weighted %
Ever have done farmwork[a]				
No	1992	84.8	1412	65.0
Yes	219	8.0	561	21.0
Yes, migrant[b]	197	7.2	370	14.0
Missing data	52		111	
Hours worked per week				
Nonworker	2060	86.7	1657	73.7
1-10 hours	222	9.0	335	13.7
11-20 hours	42	1.8	141	5.6
≥21 hours	57	2.5	158	7.0
Missing data	79		163	
Farmwork-related injury				
Non-farmworker	1992	84.8	1412	65.0
No	239	8.4	462	17.5
Yes	103	4.2	329	11.7
Don’t know	74	2.6	140	5.7
Missing data	52		111	
Other work-related injury				
Nonworker	1509	64.5	957	42.9
No	726	29.4	906	38.6
Yes	149	6.1	436	18.6
Missing data	76		155	

[a] Picking or packing fruits or vegetables or doing other work in the fields.
[b] Travel away from home for part of the year to do farmwork.

Table 2. Distribution of selected responses for health risk behaviors by gender among Hispanic adolescents.

Variable	Female (n = 2460)		Male (n = 2454)	
	n	Weighted %	n	Weighted %
During the past 30 days, on how many days did you smoke cigarettes?				
None	1839	75.2	1585	66.3
1-5 days	402	16.1	453	18.3
6-19 days	132	5.9	190	8.3
≥20 days	75	2.8	201	7.1
Missing data	12		28	
During the past 30 days, how many days did you have at least one drink of alcohol?				
None	1332	55.8	1261	54.6
1-5 days	800	32.7	659	27.6
6-19 days	246	9.7	304	12.5
≥20 days	47	1.8	160	5.3
Missing data	28		56	
During the past 30 days, how many times did you use marijuana?				
None	2060	85.0	1748	74.9
1-9 times	268	10.8	325	13.3
10-39 times	74	3.1	170	6.7
≥40 times	34	1.1	163	5.1
Missing data	24		48	
During your life, with how many people have you had sexual intercourse?				
None	1802	75.0	1230	55.5
1-2 persons	471	19.4	484	20.2
3-4 persons	75	2.8	240	10.8
≥5 persons	71	2.8	371	13.5
Missing data	41		129	
How old were you when you had sexual intercourse for the first time?				
Never	1802	75.0	1230	55.5
≤12	109	4.2	423	15.9
13-14	137	5.4	318	13.7
≥15	16	0.7	40	1.8
Don't know	355	14.7	314	13.1
Missing data	41		129	
During the past 12 months, how many times were you in a physical fight?				
Never	1920	80.4	1431	61.1
1-3 times	385	15.7	674	30.3
4-7 times	86	3.4	152	6.4
≥8 times	48	0.5	163	2.2
Missing data	56		146	
Overall, would you say that your emotional or mental health is...				
Excellent	623	23.6	774	31.3
Very good	655	28.1	709	30.8
Good	798	34.1	628	26.8
Fair	247	10.5	171	7.3
Poor	78	3.7	97	3.8
Missing data	59		75	

(continued)

Table 2 (cont'd). Distribution of selected responses for health risk behaviors by gender among Hispanic adolescents.

Variable	Female (n = 2460)		Male (n = 2454)	
	n	Weighted %	n	Weighted %
On how many of the past seven days did you exercise or participate in physical activity either for at least 20 minutes that made you sweat and breathe hard or for at least 30 minutes that did not make you sweat or breathe hard?				
None	892	35.5	754	30.4
1-2 days	439	18.3	385	16.5
3-4 days	530	22.4	444	19.6
≥5 days	557	23.8	771	33.5
Missing data	42		100	

Table 3. Distribution of confounders by gender among Hispanic adolescents.

Variable	Female (n = 2460)		Male (n = 2454)	
	n	Weighted %	n	Weighted %
Ethnicity				
Hispanic or Latino	2311	95.2	2252	93.3
White	89	3.6	109	4.3
Other	33	1.2	64	2.4
Missing data	27		29	
Age (years)				
14	559	22.4	456	18.8
15	1451	58.6	1282	51.2
16	312	13.0	478	20.3
17	88	3.8	145	6.0
18+	50	2.3	93	3.7
Martial status				
Single	1941	81.3	1696	75.3
Married or living as married	400	17.2	501	21.9
Separated/divorced/widowed	38	1.5	93	2.8
Missing data	81		164	
Family's living standard				
Very well off	400	15.8	470	19.3
Very comfortable	1302	55.0	1190	52.9
Getting along	601	26.3	537	23.6
Nearly poor	53	2.0	51	2.1
Poor	23	0.9	57	2.1
Missing data	81		149	

There was no obvious difference in the distribution of potential confounders by gender (table 3). As indicated previously, ethnicity was mainly Hispanic. More than half of the sample was 15 years old. Most of the students reported they were single (81% female, 75% male); however, 17% of females and 22% of males reported that they were married or living as married. The majority of students reported their family's standard of living to be very comfortable or very well-off, with 2% of males and 1% of females reporting a poor family living standard. The standard of living was similar regardless of farmworker status; approximately 70% of each gender reported being very well off or very comfortable.

After adjustment for age, marital status, and perceived family living standard, adolescent males working as migrant farmworkers had significantly higher mean ARS

Table 4. Mean aggregate risk scores (ARS) by work history and gender among Hispanic adolescents, adjusted for confounders.

	Mean ARS[a]	
Variable	Female	Male
Have you ever done farmwork		
Never	7.3	9.3
Yes	7.3	9.4[b]
Yes, as migrant farmworker	7.8	11.2[c]
Hours worked per week		
Nonworker	7.0	8.9
1 - 10 hours	8.1[c]	10.3[c]
11 - 20 hours	10.1[c]	11.8[c]
>20 hours	11.5[c]	13.7[c]
Farmwork-related injury		
Never done farmwork	7.3	9.3
No	7.8	10.2
Yes	8.8[c],[d]	11.6[c],[d]
Don't know	4.7[c],[d],[e]	6.9[c],[d],[e]
Other work-related injury		
Nonworker	6.7	8.5
No	8.1[c]	9.8[c]
Yes	9.7[c],[f]	11.5[c],[f]

[a] Adjusted for age, marital status and family's living standard.
[b] $p < 0.05$ compared to 1-10 hours.
[c] $p < 0.05$ compared to non-farmworkers or nonworkers.
[d] $p < 0.05$ compared to not injured.
[e] $p < 0.05$ compared to injured.
[f] $p < 0.05$ compared to migrant farmworker.

(11.2) than males who had not done farmwork (9.3) and males who had done farmwork but had not migrated (9.4) (table 4). The ARS in both genders increased as the number of hours worked per week increased. The mean ARS for adolescents with farmwork--related injuries was also significantly higher for both genders (female = 8.8, male = 11.6) when compared to those who did farmwork but were not injured (female = 7.8, male = 10.2) and to non-farmworkers (female = 7.3, male = 9.3).

Tables 5 and 6 present the associations between ARS and farmwork-related and non-farmwork, work-related injury adjusted for confounding. Table 5 is restricted to respondents who had engaged in farmwork, while table 6 includes all those who reported to have worked. After adjustment for age, marital status, and family living standard, there were no associations between ARS and farmwork-related injury among adolescents who had done farmwork (table 5). The one exception was the association of ARS with farmwork-related injury among male adolescents who reported to be married or living as married and those reporting to be separated/widowed/divorced.

Table 6 shows that after adjustment for farmwork and demographic variables, there were significant associations between ARS (top ARS tertile for females and top two ARS tertiles for males) and non-farmwork, work-related injury. Females (OR = 2.2, 95% CI 1.1-4.4) and males (OR = 1.7, 95% CI 1.0-2.9) who had done farmwork were more likely to report a non-farmwork, work-related injury than respondents who had worked but not done farmwork. Those males who reported that they were poor and who reported to be married or living as married and those reporting to be separated/widowed/divorced also reported increased non-farmwork, work-related injuries.

Table 5. Adjusted[a] odds ratios and 95% confidence intervals for the association between ARS and farmwork-related injury among Hispanic adolescents who have engaged in farmwork by gender.

	Females		Males	
Characteristic	OR	95% CI	OR	95% CI
Aggregate risk score (tertiles)[b]				
1	1.0	Referent	1.0	Referent
2	1.0	0.4-2.4	0.8	0.5-1.1
3	0.9	0.6-1.3	1.0	0.7-1.5
Age (years)				
14	0.1	0.0-0.8	0.3	0.1-1.0
15	0.1	0.0-0.8	0.5	0.2-1.2
16	0.2	0.0-1.6	0.7	0.2-2.1
17	0.3	0.0-2.9	1.0	0.3-2.8
≥18	1.0	Referent	1.0	Referent
Marital status				
Single	1.0	Referent	1.0	Referent
Married or living as married	0.9	0.6-1.6	1.6	1.1-2.2
Separated/widowed/divorced	5.8	0.9-36.2	3.5	1.6-7.4
Family living standard				
Very well off	1.0	Referent	1.0	Referent
Very comfortable	0.6	0.3-1.4	0.3	0.2-0.5
Getting along	0.6	0.3-1.2	0.4	0.2-0.8
Nearly poor	1.5	0.4-5.4	0.7	0.3-1.7
Poor	3.1	0.1-69.6	1.6	0.3-9.7

[a] Adjusted for age, marital status and family's living standard.
[b] Tertiles for females: 4.5-4.7, 4.8-8, and 8.1-29.7; tertiles for males: 5-5.8, 5.9-11.2, and 11.3-33.7.

Table 6. Adjusted odds ratios and 95% confidence intervals for the association between ARS and non-farmwork, work-related injury among Hispanic adolescents, who worked by gender.

	Females		Males	
Characteristic	OR	95% CI	OR	95% CI
Aggregate risk score (tertiles)[a]				
1	1.0	Referent	1.0	Referent
2	1.3	0.7-2.3	1.5	1.0-2.3
3	1.8	1.1-3.2	2.0	1.2-3.1
Farmworker				
No	1.0	Referent	1.0	Referent
Yes	2.2	1.1-4.4	1.7	1.0-2.9
Age (years)				
14	0.7	0.2-2.2	0.6	0.3-1.2
15	0.5	0.1-1.8	0.7	0.4-1.1
16	0.5	0.1-2.2	0.7	0.5-0.9
17	1.1	0.2-5.7	0.8	0.5-1.5
= 18	1.0	Referent	1.0	Referent
Marital status				
Single	1.0	Referent	1.0	Referent
Married or living as married	1.0	0.5-1.9	1.6	1.2-1.9
Separated/widowed/divorced	2.6	0.7-10.2	1.8	1.2-2.7

(continued)

Table 6 (cont'd). Adjusted odds ratios and 95% confidence intervals for the association between ARS and non-farmwork, work-related injury among Hispanic adolescents, who worked by gender.

Family living standard				
Very well off	1.0	Referent	1.0	Referent
Very comfortable	1.0	0.6-1.7	0.8	0.7-1.0
Getting along	1.2	0.5-3.2	1.0	0.7-1.5
Nearly poor	1.4	0.3-6.0	1.8	0.8-4.1
Poor	1.4	0.5-4.0	3.6	1.6-8.1

[a] Adjusted for age, marital status, and family's living standard. Tertiles for females: -4.5-4.7, 4.8-8, and 8.1-29.7; tertiles for males: -5-5.8, 5.9-11.2, and 11.3-33.7.

Discussion

This study found that working adolescents reported a higher practice of adverse health behaviors, indicated as high ARS, than adolescents not working. Confirming this finding, others have found working adolescents to have increased use of alcohol (Paschall et al., 2002; de Souza et al., 2005; Ozgur et al., 2005) and substance use (Valois et al., 1999; Wakai et al., 2005). Congruent with this study, migrant adolescent farmworkers have also reported frequent substance use and injuries (Cooper et al., 2005a). The coexistence of several risk behaviors among adolescents has also been reported (Valois et al., 2001; Zullig et al., 2001; Cooper et al., 2005a; Bina et al., 2006; Camenga et al., 2006). Assigning a value to adverse behaviors to quantify them has been found operational in the assessment of socioeconomic status (Langille et al., 2003) and in a study of a framework of youth assets (Reininger et al., 2005). Weighted scales have been found to perform better than unweighted scales (Foldspang and Montgomery, 2000).

An important finding in this study was the association between non-farmwork, work-related injury and elevated ARS among adolescents. This study also found a significant association between non-farmwork, work-related injury and adolescents who did farmwork. Might adolescent farmworkers, who are used to working under poor environmental conditions, be more willing to take work-related risks in other work settings? Might adolescent farmworkers take on the types of non-farmwork jobs that hold a higher risk of physical injury? Do high-risk behaviors such as alcohol use predispose adolescent workers to injury in the workplace? Shipp et al. (2005) reported an association between work-related injury and substance use among adolescents in rural south Texas. Does workplace exposure to adults who engage in high-risk behaviors predispose adolescents to adopting similar behaviors? Studies that lead to a better understanding of injury causality in this population of adolescent workers will be of great value.

This study found that male adolescents who were migrant farmworkers were more likely to have a higher mean ARS than adolescent farmworkers who did not migrate. However, the results of this study indicate that there was no association between ARS and farmwork-related injury among adolescents who had done farmwork. These results suggest the need to further assess injury risk factors among adolescent farmworkers, such as the work environment. Unintentional injuries have been associated with specific health risk behaviors among adolescents (Hingson et al., 2005). Identifying the injury risk factors among working adolescents, particularly farmworkers and migrants who are under additional stress (Miller and Salazar, 2004; Larson et al., 1990; Kim-Godwin and Bechtel, 2004), remains to be addressed.

Consistent with findings of other studies (Carriere, 2005; Wakai et al., 2005), increasing hours worked per week for both genders was associated with increasing ARS. Potential explanations for the higher ARS associated with longer working hours may include

greater exposure to others who practice health risk behaviors (i.e., older coworkers who use cigarettes and alcohol) (Kosterman et al., 2000; Safron et al., 2001).

The only factor in these data that appeared to be related to farmwork-related injury and non-farmwork, work-related injury was other-than-single status among males. The odds were significant for those male adolescents who reported "married or living as married" or "separated/widowed/divorced." Marriage has been associated with increased unintentional injury in other study populations (Siegel et al., 1996; Gerberich et al., 1998; Zullig et al., 2001; Liao et al., 2001). And early marriage among adolescents has been associated with limited education and work experience, as well as higher rates of divorce and separation (Singh, 1998). The impact of marriage on adolescent quality of life, particularly in stressed populations (Kim-Godwin and Bechtel, 2004), deserves further investigation, as it has been described to potentially have an impact on unintentional injury (Blum and Nelson-Mmari, 2004).

Available government statistics do not provide work-related injury data for young workers, particularly those laboring in hazardous industries such as agriculture (Miller and Salazar, 2004; Miller and Bush, 2004). This study contributes data that may stimulate further examination of the association among work, work-related injury, and health risk behaviors among Hispanic adolescents. One of the strengths of this study is that five out of the seven constructs included in the ARS have been found to be reliable (kappa = 60.7). The description of the association between health risk behaviors and work-related injuries among Hispanic adolescents is an important new addition to the literature. The examination of several health risk behaviors, as indicators of risk among working Hispanic adolescents, has not been previously described.

Limitations

This study has several limitations. The work and injury data were nonspecific in nature. The cross-sectional study design makes it impossible to determine whether the health risk behaviors predated the reported work-related injury. The circumstances surrounding the injuries were not described, which limits ability to determine the time relationship to health risk behaviors. The number of hours worked at the time of the survey administration may have been different from the number of hours worked at the time of injury, since the survey instrument did not capture those differences. The accuracies of the work-related injury histories are limited by the self-report mechanism and limitations of recall.

The overall response rate was 48% (although the response rate from the participating high schools was 72%), and the differences between the responding and non-responding populations led to selection bias. Although the overall participation rate was lower than ideal, this study has value in that there had not been previous studies of this nature in this population. Given the anonymous nature of the questionnaire, there was no way to assess if students who refused to participate were comparable to students who did participate.

The study did not include any school dropouts, so no inferences can be made about adolescents of this age group who are not enrolled in school. The annual dropout rates in both participating and nonparticipating school districts averaged between 0.9% and 1.5% and were similar to the Texas state average of 0.9%; thus, it is not likely that dropouts impacted the study results greatly (Lerd et al., 2006).

All data were self-reported and are prone to misclassification. In addition, some of the characteristics used to calculate the ARS, particularly age at first sexual intercourse and number of times in a physical fight, appear to have been overestimated among males. If this exaggeration occurred more frequently among adolescent males who did farmwork than among adolescent males who did not do farmwork, then our estimates of the association were biased away from the null.

The TBRFS instrument was not subjected to validity testing. Psychometric testing of the ARS was beyond the scope of this analysis. It may appear that student's age and marital status are incongruous with 22% of students reporting they were not single. Texas had the second highest teen pregnancy rate in the nation in 2001 (29.5 per 1,000 females age 13 to 17), and the rate is even higher in the LRGV (38.5 per 1,000 for females age 13 to 17) (Hamilton et al., 2003) There is an increased likelihood that adolescents in this region tend to live together in the home of one of their parents as they become parents themselves.

Study Implications

Findings from this study have potential implications for prevention efforts, taking into account a variety of health risk behaviors for adolescent farmworkers as reported by others working with adolescents in school settings (Hallfors et al., 2006a; Hallfors et al., 2006b). In order to plan preventive measures, additional detailed research on working youth is needed to better understand the causes for high-risk behaviors and work-related injuries. Given the risk-taking attitudes among adolescents (Steinberg, 2004, 2005), it is important to conduct further research to develop early interventions focused on younger adolescents who may work part-time. The worksite has been described as an attractive venue for conducting health promotion interventions among adolescents (Stoddard et al., 2005). Nevertheless, more applied research and evaluation are needed to evaluate the feasibility and efficacy of conducting interventions in agricultural settings. The development of interventions may involve partnerships among schools, employers, and parents to promote healthful behaviors for working Hispanic adolescents (Rubenstein et al., 1999; Schuster et al., 2001).

Conclusion

This study supports an association between elevated ARS and non-farmwork, work--related injuries among Hispanic adolescents. There is a need to elucidate the relationship between health behavior practices among working adolescents and to use this information for better targeting prevention programs. Such epidemiological research is needed to properly identify the interactions between health risk behaviors and work among Hispanic adolescents, particularly such high-risk groups as farmworkers.

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Appendix

Constructs, questions, response categories, variable scores, variable weights, and minimum to maximum construct scores used to calculate the ARS.

Construct	Questions Used to Ascertain Status and Response Categories	Variable Score	Variable Weight	Min.-Max. Construct Score
Tobacco use	During the past 30 days, on how many days did you smoke cigarettes?		0.5	
	0 days	1		
	1 to 2 days	2		
	3 to 5 days	3		
	6 to 9 days	4		
	10 to 19 days	5		
	20 to 29 days	6		
	For all 30 days	7		1 to 6
	During the past 30 days, on the days you smoked, how many cigarettes did you smoke per day?		0.5	
	I did not smoke cigarettes during the past 30 days	1		
	Less than 1 cigarette per day	2		
	1 cigarette per day	3		
	2 to 5 cigarettes per day	4		
	6 to 10 cigarettes per day	5		
	11 to 20 cigarettes per day	6		
	More than 20 cigarettes per day	7		1 to 7
Alcohol use	During the past 30 days, on how many days did you have at least one drink of alcohol?		0.5	
	0 days	1		
	1 to 2 days	2		
	3 to 5 days	3		
	6 to 9 days	4		
	10 to 19 days	5		
	20 to 29 days	6		
	For all 30 days	7		1 to 6
	During the past 30 days, on how many days did you have five or more drinks of alcohol in a row, that is, within a couple of hours?		0.5	
	0 days	1		
	1 day	2		
	2 days	3		
	3 to 5 days	4		
	6 to 9 days	5		
	10 to 19 days	6		
	20 days	7		1 to 6

Construct	Questions Used to Ascertain Status and Response Categories		Variable Score	Variable Weight	Min.-Max. Construct Score
Drug use	During the past 30 days, how many times did you use marijuana?			0.17	
		0 times	1		
		1 to 2 times	2		
		3 to 9 times	3		
		10 to 19	4		
		20 to 39	5		
		40 times	6		1 to 5
	During the past 30 days, how many times did you use any form of cocaine, including powder, crack, or freebase?			0.17	
		0 times	1		
		1 to 2 times	2		
		3 to 9 times	3		
		10 to 19	4		
		20 to 39	5		
		40 times	6		1 to 5
	During the past 30 days, how many times have you sniffed glue, breathed the contents of aerosol spray cans, or inhaled any paints or spray to get high?			0.17	
		0 times	1		
		1 to 2 times	2		
		3 to 9 times	3		
		10 to 19	4		
		20 to 39	5		
		40 times	6		1 to 5
	During your life, how many times have you used heroin?			0.17	
		0 times	1		
		1 to 2 times	2		
		3 to 9 times	3		
		10 to 19	4		
		20 to 39	5		
		40 times	6		1 to 5
	During your life, how many times have you used methamphetamines?			0.17	
		0 times	1		
		1 to 2 times	2		
		3 to 9 times	3		
		10 to 19	4		
		20 to 39	5		
		40 times	6		1 to 5
	During your life, how many times have you taken steroid pills or shots without a doctor's prescription?			0.17	
		0 times	1		
		1 to 2 times	2		
		3 to 9 times	3		
		10 to 19	4		
		20 to 39	5		
		40 times	6		1 to 5

Construct	Questions Used to Ascertain Status and Response Categories	Variable Score	Variable Weight	Min.-Max. Construct Score
Sexual activity	During your life, with how many people have you had sexual intercourse?		0.5	
	I have never had sexual intercourse	1		
	1 person	2		
	2 people	3		
	3 people	4		
	4 people	5		
	5 people	6		
	6 people or more	7		1 to 7
	How old were you when you had sexual intercourse the first time?		0.5	
	I have never had sexual intercourse	1		
	11 years old or younger	2		
	12 years old	3		
	13 years old	4		
	14 years old	5		
	15 years old	6		
	16 years old	7		
	17 years or older	8		1 to 8
Physical fighting	During the past 12 months, how many times were you in a physical fight?		1	
	0 times	1		
	1 time	2		
	2 or 3 times	3		
	4 to 5 times	4		
	6 or 7 times	5		
	8 or 9 times	6		
	10 or 11 times	7		
	12 or more times	8		1 to 7
Mental and emotional health	Overall, would you say that your emotional or mental health is...		1	
	Excellent	1		
	Very good	2		
	Good	3		
	Fair	4		
	Poor	5		1 to 5

Construct	Questions Used to Ascertain Status and Response Categories	Variable Score	Variable Weight	Min.-Max. Construct Score
Physical activity	On how many of the past seven days did you exercise or participate in physical activity for at least 20 minutes that made you sweat and breathe hard, such as basketball, soccer, running, swimming laps, fast bicycling, fast dancing, or similar aerobic activities?		0.5	
	0 days	1		
	1 day	2		
	2 days	3		
	3 days	4		
	4 days	5		
	5 days	6		
	6 days	7		
	7 days	8		1 to 7
	On how many of the past seven days did you participate in physical activity for at least 30 minutes that did not make you sweat or breathe hard, such as fast walking, slow bicycling, skating, pushing a lawn mower or mopping a floor?		0.5	
	0 days	8		
	1 day	7		
	2 days	6		
	3 days	5		
	4 days	4		
	5 days	3		
	6 days	2		
	7 days	1		1 to 7
ARS	Represents the weighted sum of the seven constructs.			16 to 96