2003

Predicting occupational injuries among California hired farmworkers

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DOI: <https://doi.org/10.31979/etd.t6gn-kg7d>
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PREDICTING OCCUPATIONAL INJURIES
AMONG CALIFORNIA HIRED FARMWORKERS

A Thesis

Presented to

The Faculty of the Department of Psychology

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Masters of Science

by

Monique E. Brammeier

May 2003

UMI Number: 1415707

UMI Microform 1415707

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ABSTRACT

PREDICTING OCCUPATIONAL INJURIES AMONG CALIFORNIA HIRED FARMWORKERS

By Monique E. Brammeier

Farmwork is one of the highest risk occupations within the United States. This thesis examines variables associated with farmworker injury. In order to determine which workers are more likely to be injured, analysis of a population-based study was done examining the following predictor variables: gender, marital status, age, education, years of farmwork experience, alcohol use, drug use, years in the U.S., and resident status. Discriminant analysis determined that years of farmwork experience, age, and resident status were highly associated with injury. Those more likely to be injured were more experienced farmworkers that were older and documented residents of the U.S. To a lesser degree, age and alcohol use were also associated with injury. Those who were older and drank alcohol were more likely to be injured. With all predictor variables, 78% of the injured and non-injured cases could be correctly classified. These predictor variables differentiated between injured and non-injured workers.

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Introduction

In order to design effective interventions that reduce the number of occupational injuries, research must be done to assess risk factors that influence injury within a particular occupation (Gunderson et al., 1990; Layde, 1990). These risk factors can be associated with the worker, the environment, and the equipment used (Layde). Although farmwork is considered one of the highest risk occupations (Bureau of Labor Statistics, 2000), to date, few studies have examined risk factors predicting farmworker injuries (Crawford et al., 1998; Gunderson et al.; Layde). The purpose of this study is to identify determine whether occupational injury among California hired farmworkers can be predicted from a group of relevant variables.

Definition of Terms

The National Agricultural Workers Survey (NAWS) defined farmworkers as those who work in crop agriculture, which includes field work in nursery products, cash grains, field crops (including fruits and vegetables), silage production and the production of other animal fodder (United States Department of Labor, 2000). According to the United States Department of Labor (DOL) Employment and Training Administration, general farmworkers perform the following tasks:

Apply pesticides, herbicides, and fertilizer to crops and livestock; plant, maintain, and harvest food crops; and tend livestock and poultry. Repair farm buildings and fences. Duties may include: operating milking

machines and other dairy processing equipment; supervising seasonal help; irrigating crops; and hauling livestock products to market (U.S. DOL, n.d.).

As seen from this definition, farmwork can involve a variety of tasks. Most studies refine this broad definition of farmworkers to particular subgroups within the agricultural worker field. Zhou and Roseman (1994) defined a farm operator as “a farmer who was not only involved in agricultural activities, but who also made daily decisions on sales, purchases, and planning for the farm” (p. 386). However, the demographic characteristics of hired farmworkers are different from those of farm owners/operators. Many owners/operators are born in the United States and white (McCurdy & Carroll, 2000), while many hired farmworkers are foreign born and Hispanic (U.S. DOL, 2000).

Some studies further restricted their definition of farmworkers by concentrating on workers who primarily farmworked all year long. Some have estimated that there are over two million hired farmworkers in the U.S.; of those, approximately 900,000 are seasonal workers (McCurdy & Carroll, 2000). Seasonal farmworkers are those workers who do not follow the crop throughout the growing cycle but specialize in “planting, weeding, irrigating, harvesting, or packing crops” (U.S. DOL, 1991). Brison and Pickett (1992) excluded seasonal workers who only worked during the haying season, which lasted approximately two to four weeks. Other studies included farmworkers regardless of the amount of time spent farmworking and categorized by the number of hours worked (Crawford et al., 1998; Lyman, McGwin, Enochs, & Roseman, 1999). Because a large

portion of hired farmworkers are seasonal workers, excluding this group would under-represent the number of injuries occurring within the hired farmworker population.

The United States Bureau of Labor Statistics (BLS) defined occupational injury as “any injury such as a cut, fracture, sprain, amputation, etc., which results from a work-related event or from a single instantaneous exposure in the work environment” (U.S. BLS, n.d.). A “recordable” injury is any occupational injury that results in death or loss of consciousness, restriction of work activity, transfer to another job, or medical treatment, not including first aid (U.S. BLS, n.d.). Following the above definition, most farmworker studies restricted injury definitions to injuries requiring either medical attention or restricted work activities (Brison & Pickett, 1992; Crawford et al., 1998; Lyman et al., 1999; Nordstrom et al., 1995; Stueland et al., 1995; Zhou & Roseman, 1994).

Occupational Injuries among Agricultural Workers

For the year 2000, the BLS reported that agricultural production, crops, and livestock workers had an injury rate of 7.3 per 100 full-time workers, which excludes occupational illnesses (U.S. BLS, 2001). The National Safety Council reported that in the year 2000, agriculture had “the second highest death rate among the major industry divisions” (National Safety Council, n.d.). Various studies examined injury rates among farm operators. Stallones, Keefe, and Xiang (1997) found that within the last twelve months 11.7% of farm operators sampled had experienced a work-related injury. Zhou and Roseman (1994) found that 7.8% of farm operators were injured in a similar 12-

month period. Lyman et al. (1999) found that 23.4% of farmworkers, over 80% being farm operators, had experienced an injury at some time.

Few studies examined non-owners/operators. Within a three-year time interval, 8.4% of migrant farmworker interview participants were injured (Ciesielski, Hall, & Sweeney, 1991). This finding suggests that the rate of injury among migrant workers may be similar to that of owners/operators.

Predicting Occupational Injuries among Agricultural Workers

This section summarizes some key findings among the following variables concerning the prediction of farmworker injuries: gender, marital status, age, education, years of farmwork experience, alcohol use and drug use. Studies have found that male farmworkers were more likely to be injured than females (Pratt et al., 1992; Stueland et al., 1995). In multivariate analysis, Layde, Nordstrom, Stueland, Brand, and Olson (1995) also found that gender was associated with increased risk of injury; men were more likely to be injured. Among Ohio owners/operators, marital status was associated with injury; those divorced were more likely to be injured, although no significant relationship was found in bivariate analysis (Crawford et al., 1998). However, in multivariate analysis, Crawford et al. found that divorced farmworkers were at increased risk of injury.

Among studies, mixed results have been found between age and occupational injury. Lyman et al. (1999) and Stallones et al. (1997) found no relationship between age and injury among owners/operators. However, Pratt et al. (1992) found that even after

correcting for exposure rates, the 31-40 and 51-60 age groups had the highest injury rates among dairy farmworkers. Another study determined that farmers less than 30 years old were more likely to report injuries (Crawford et al., 1998). Zhou and Roseman (1994) also found that younger farm operators, 25-44 year-olds, were more likely to be injured. In multivariate analysis, Crawford et al. and Zhou and Roseman found that younger workers were associated with increased risk of injury.

These mixed findings could be attributed to the differences in the samples collected. Most samples consisted of older workers; Crawford et al. (1998) reported a mean age ranging from 50.9 to 55.2 among the three participation categories of respondents. Of the Zhou and Roseman (1994) respondents, more than half were between the ages of 45 and 64 years of age. Brison and Pickett (1992) had greater variation in age among their sample, and found that as age increased, so did the risk of injury, which was statistically significant.

Crawford et al. (1998) and Nordstrom et al. (1996) found that level of education was not significantly related to injury. Conversely, Lyman et al. (1999) found that workers with post-high school education were significantly more likely to be injured than those who were high school graduates or had even less education. Zhou and Roseman (1994) also found that higher levels of education were associated with higher risk of injury. In multivariate analysis, Lyman et al. found that post-high school education was associated with increased risk of injury among white and black farm owners/operators. Differences in findings could be attributed to the categorization of education. Lyman et al. had two levels of education: high school or less and post-high school education.

Crawford et al. and Nordstrom et al. categorized education into at least four different subcategories. This could explain why Lyman found a significant difference while Crawford et al. and Nordstrom et al. did not.

Brison and Pickett (1992) found that an increase in farm experience resulted in an increased risk of injury. However, age was not controlled for, so the effect could be that of age and not years of experience in farmwork. Although Ciesielski et al. (1991) reported that injured migrant farmworkers had a mean of 4.5 years of experience while non-injured workers reported a mean of 6.1 years, this difference was not significant. The strength of the association between work experience and injury could have been weakened by the small sample size.

Little research has been done examining alcohol use among those with occupational injuries (Smith & Kraus, 1988). Dawson (1994) found that heavy drinking was associated with an increased risk of injury among various occupational categories. Excluding farmworkers, Zwerling et al. (1996) found a positive association between alcohol use and risk of injury among older workers. Among Ohio farmers, alcohol use was associated with injury but not significantly related (Crawford et al., 1998). Zhou and Roseman (1994) found a significant relationship between increase in alcohol consumption and increase in injury. They also found that farm operators who drank alcohol in the past year were more likely to be injured than those who did not drink alcohol. Lyman et al. (1999) also found that those who drank larger amounts of alcohol were more likely to have been injured than those who did not drink any alcohol. However, in multivariate analysis, Lyman et al. discovered that alcohol use was only

associated with injury among black farmworkers and not white or black owners/operators.

Few studies have been done examining the relationship of drugs with injury among farmwork. Brison and Pickett (1992) found that the use of prescription drugs was associated with injury, although not significantly. However, no studies were found examining the association of illicit drugs with farmwork injuries.

In summary, past research has suggested that gender, age, education, and alcohol use may be associated with risk of agricultural injury. Males had an increased risk of injury along with males who were divorced. Conflicted findings regarding age were reported, however, those examining age in a multivariate model found that younger age was associated with increased risk of injury. Level of education also resulted in conflicted findings. Suggesting that post-high school education was associated with injury risk. Most studies found a significant relationship between alcohol use and injury.

Strengths and Limitations of Previous Research

Several population-based studies have been conducted examining risk factors that predict injury. By examining a diverse range of variables, these studies have provided a foundation on which future research can be based. They have identified variables associated with injury risk. Most studies, however, involved only farm owners/operators not hired farmworkers. No studies were found examining the risk factors that could predict injury among hired farmworkers.

Many hired farmworkers are unauthorized to be working in the United States (DOL, 2000). Studies using compensation data would miss those unauthorized workers that were injured but could not file a claim. Difficulty in obtaining access to hired workers may be due to the migrant, seasonal nature of their work. In California, many workers return to their home village in another country after the crop work is completed (Villarejo & Baron, 1999). Little is known about the incidence of injury within this population (Mobed, Gold, & Schenker, 1992), which has restricted prediction of injury among farmworkers.

Because hired farmworkers may have difficulty accessing medical care (Villarejo & Baron, 1999), studies that restricted farmworker injuries to either medical care being sought or restricted work activity may exclude valid occupational injuries among hired farmworkers. Underestimation of injury would then occur among those with limited health care access. Including only those injuries that restrict activity could also miss potentially valid and important injuries. Although injuries may have occurred within this population, they are not included in studies with the above definition of injury.

In an effort to counter limited use of medical care, Pratt et al. (1992) included injuries independent of medical care and work restrictions. They reasoned that farmworkers might be less likely to seek medical care than other types of workers. Some studies used workers' compensation data and only claims that were accepted were included in the study (Demers & Rosenstock, 1991; Heyer, Franklin, Rivara, Parker, & Haug, 1992). This method would miss all of the injuries occurring in those workers that were undocumented or illegally working in the United States that did not file claims.

Because many hired farmworkers are undocumented workers, the use of compensation data would further underestimate the rate of injuries among the group.

Variables found associated with injury among primarily white owners/operators may not be applicable to the primarily Hispanic hired workers. Because of the difference among various race-ethnicity categories, variables unique to a particular sub-population of farmworkers may be related to the risk of injury. The following variables unique to California Hispanic farmworkers were examined in the current study in relationship to injury: number of years in the United States and current resident status.

Purpose and Hypotheses

A population-based study among hired farmworkers would provide the information about factors associated with injury needed to develop proper interventions for reducing injury rates among this population of farmworkers. The current study will determine if gender, marital status, age, education, farmwork experience, alcohol use, drug use, number of years in the U.S., and current resident status are associated with injury.

The first hypothesis is that males will be more likely to be injured than females. The second hypothesis is that single/divorced/widowed workers will be more likely to be injured than married workers. The third hypothesis is that younger workers will be more likely to be injured than older workers. The fourth hypothesis is that those with more education will be more likely to be injured than those less educated. The fifth hypothesis is that those more experienced in farmwork will be less likely to be injured than those

less experienced. The sixth hypothesis is that those who drink alcohol will be more likely to be injured than those who do not drink alcohol. The seventh hypothesis is that those who use illicit drugs will be more likely to be injured than those who do not use illicit drugs. Because of the lack previous research, no hypothesis was made regarding length of stay in the U.S. and resident status.

Method

Participants

Eligible participants were those at least 18 year old who had performed hired farm work within the previous twelve months. Those living in the following California communities were included in the multi-step random sampling procedure: Arbuckle, Calistoga, Gonzales, Cutler, Firebaugh, Mecca, and Vista. Because of the small number of female farmworkers, women were deliberately over-sampled to ensure that a large enough sample was collected to identify gender-specific outcomes.

Of 11,876 enumerated dwellings within the seven communities, 2,989 dwellings were randomly selected and contacted by an interviewer. Of those dwellings that were contacted, 1,612 eligible persons were identified. Sometimes more than one person per dwelling was eligible. Of those eligible individuals, 1,174 persons were asked to participate in the survey, one person per household. Of these selected individuals, 971 agreed to participate in the study. The participation rate was 82.7% of the 1,174 eligible individuals. More than 96% of the participants preferred the Spanish version of the

survey while only 33 subjects preferred English. Of those participating in the main survey, 652 participated in the physical exam and risk behavior questionnaire, resulting in a participation rate of 67.1% for the second phase of the study.

Of 639 respondents, 572 (89.5%) were Mexican and 52 (8.1%) were Other. Fifteen (2.3%) identified themselves as white and none were African American/Black. As seen in Table 1, a majority of participants were male and married. The average age of the sample was 36 with six years or less of formal education, and approximately twelve years of farmwork experience in the U.S. Almost half of those questioned consumed alcoholic beverages while few had tried or used drugs.

Materials

Archival data was used from the California Agricultural Worker Health Survey (CAWHS), which was conducted by the California Institute of Rural Studies and funded by the California Endowment. Data was collected from March 1999 to December 1999. A population based household survey was conducted among California hired farmworkers. This survey was conducted to assess the health status of hired farmworkers in California. The survey collected information on a variety of topics. The following topics were addressed in this study: gender, marital status, age, education, years involved in farmwork, alcohol and drug use, number of years in the United States, current resident status, and occupational injuries.

Education level was determined by the last year of formal education completed. Years of experience were limited to experience in the United States farmworking,

Table 1

Demographic and Risk Characteristics, Total Sample (N = 538)

	N	%
Gender		
Male	344	64.1
Female	193	35.9
Marital Status		
Single	140	26.7
Married	329	62.8
Divorced/Widowed	55	10.5
Age	M = 35.8	SD = 11.32
Education		
No formal education thru 3rd grade	168	31.7
4th thru 6th grade	183	34.5
7th grade or higher	179	33.8
Years of Farmwork Experience	M = 12.0	SD = 9.68
Alcohol Use		
Yes	250	47.2
No	280	52.8
Drug Use		
Yes	82	15.3
No	455	84.7
Years in the U.S.	M = 13.9	SD = 9.72
Resident Status		
Documented	353	71.2
Undocumented	143	28.8
Ever Injured		
Yes	121	22.5
No	417	77.5

counting only those years when 15 days or more were spent farmworking. Alcohol use was defined as having drunk an alcoholic beverage within the last month. Respondents were asked if they had ever tried or used drugs. Number of farmwork experience years in the U.S. was defined as the number of years where 15 days or more were worked. Current resident status was defined as government documented or undocumented workers. Injury was defined as whether the worker ever had any workers' compensation injuries while doing farmwork.

Procedure

Interviewers requested a signature if the subject agreed to participate. The interviews were performed in the participant's preferred language, either Spanish or English. The CAWHS project included a main survey and a risk survey. The main survey took place in the participants' residence, usually when first approached by the interviewer, requiring approximately 90 minutes to complete. Usually following completion of the main survey, participants were asked to schedule a second appointment for a physical exam and administration of the risk behavior survey at a clinic or medical facility. A financial incentive of \$30, transportation to and from the facility, and a free follow-up appointment to discuss results of the exam were offered to participants if they agreed to this second interview. The risk behavior questionnaire required approximately 25 minutes to complete. All interviews were conducted by CAWHS staff trained specifically to administer the CAWHS. The use of subject identification numbers instead of participants' names protected the participants' confidentiality.

Results

Descriptive Statistics

Table 2 compares the two groups (injured, not injured) on the nine predictor variables. The two groups differed significantly on seven of the nine predictor variables: gender, marital status, age, years of farmwork experience, alcohol use, years in the U.S., and resident status. Interestingly, only two variables were in the hypothesized direction; males were more likely to be injured than females and those who drank alcohol were more likely to be injured than those who did not drink alcohol. Contrary to expectations those injured were more likely to be married, older, and more experienced in farmwork. No hypothesis was made regarding length of stay in the U.S. and resident status because of lack of previous research. Those injured were in the U.S. for a longer period of time and a documented resident of the U.S. Unexpectedly, drug use was associated with the non-injured group. No differences were found among education level between injured and not injured; both groups were similarly distributed among the three education levels.

Correlations

Correlations among predictor variables are depicted in Table 3, which demonstrates many significant relationships between the variables. Age, years of farmwork experience, years in the U.S., and resident status were correlated with six of the predictor variables. The highest correlation was between years in the U.S. and years of farmwork experience ($r = .84$). Age was highly correlated with both years in the U.S.

Table 2

Demographic and Risk Variables by Injury Status

	Injured		Not Injured		Chi-square
	N	%	N	%	
Gender					21.40*
Male	99	81.8	245	58.9	
Female	22	18.2	171	41.1	
Marital Status					5.23*
Married	84	71.8	245	60.2	
Not Married	33	28.2	162	39.8	
Age	M = 41.1	SD = 10.08	M = 34.3	SD = 11.2	t = -6.08**
Education					.38
Less than 4th grade	37	31.6	131	31.7	
4th thru 6th grade	38	32.5	145	35.1	
7th grade or higher	42	35.9	137	33.2	
Years of Farmwork Experience	M = 17.4	SD = 9.18	M = 10.5	SD = 9.28	t = -7.01**
Alcohol Use					7.22*
Yes	68	58.1	182	44.1	
No	49	41.9	231	55.9	
Drug Use					3.70
Yes	25	20.8	57	13.7	
No	95	79.2	360	86.3	
Years in the U.S.	M = 18.5	SD = 8.98	M = 12.6	SD = 9.53	t = -5.91**
Resident Status					18.74*
Documented	99	87.6	254	66.7	
Undocumented	14	12.4	127	33.3	

Table 3

Pearson Correlation Coefficients, Predictor Variables (N = 436)

	Gender	Marital Status	Age	Education	Years of Farmwork Experience	Alcohol Use	Drug Use	Years in the U.S.
Gender	--							
Marital Status	.07	--						
Age	.02	.25**	--					
Education	-.00	-.03	-.34**	--				
Years of Farmwork Experience	.24**	.24**	.69**	-.22**	--			
Alcohol Use	.52**	.00	.04	-.00	.06	--		
Drug Use	.28**	-.09	-.11*	.06	-.06	.22**	--	
Years in the U.S.	.14**	.24**	.72**	-.21**	.84**	.03	-.07	--
Resident Status	.03	.39**	.43**	-.14**	.49**	-.06	-.16**	.53**

Note: * $p < .05$; ** $p < .01$

($r = .72$) and years of farmwork experience ($r = .69$).

Discriminant Analysis

In order to assess whether the nine predictor variables could assist in the classification of injury, a discriminant analysis was performed. Because injuries within the general population are not at a rate of 50%, the injured group was assigned a prior probability of 25%, which is similar to the proportion of injuries found within this sample. Analysis revealed that the variables were significantly related to injury, $\lambda = .87$, $\chi^2(9) = 59.67$, $p < .001$, accounting for 13% of the variance. As seen in Table 4, years of farmwork experience, age, and resident status were highly associated with injury, regardless of inter-relatedness. Those injured had more years of farmwork experience, were older, and were documented residents. To a lesser degree, gender and alcohol use were related to injury; those injured were male and more likely to use alcohol. Although years in the U.S. did not have a high standardized coefficient, years in the U.S. had the second largest structure coefficient. Because years in the U.S. was correlated with many of the predictor variables, in particular years of farmwork experience ($r = .84$), years in the U.S. did not uniquely contribute to the classification of injury status.

Correct classification of people on injury status was 78%, as seen in Table 5. Of those not injured, 93% were correctly classified, while 26% of those injured were correctly classified. The predictor variables classified those not injured more accurately than those injured.

Table 4

Full Model Standardized and Structure Coefficients

Predictor Variable	Standardized Coefficient	Structure Coefficient
Gender (0 = Female, 1 = Male)	.13	.41
Marital Status (0 = not married, 1 = married)	-.06	.24
Age	.44	.69
Education	.28	.01
Years of Farmwork Experience	.47	.81
Alcohol Use (0 = no alcohol, 1 = alcohol)	.29	.35
Drug Use (0 = no drugs, 1 = drugs)	.19	.16
Years in the U.S.	-.05	.73
Resident Status (0 = undocumented, 1 = documented)	.32	.56
Note: Dependent variable (0 = not injured, 1 = injured)		

Table 5

Classification Results for Full Model Discriminant Analysis

Actual Group	Total	Predicted Group	
		Injured	Not Injured
Injured	97	25 (26%)	72 (74%)
Not Injured	339	23 (7%)	316 (93%)
% correctly classified:		78%	

Analysis indicated that the most important predictor variables were related to time (years of farmwork experience, age, and years in the U.S.), which are related to exposure to farmwork and potential for injury. In order to determine whether the three variables were able to classify injury as well as the full model, a second discriminant analysis was performed, using years of farmwork experience, age, and years in the U.S. as the predictor variables. These variables were significantly related to injury, $\lambda = .91$, $\chi^2(3) = 47.34$, $p < .001$, accounting for 9% of the variance. As seen in Table 6, all three variables had high structure coefficients. Years of farmwork experience had a high structure and a standardized coefficient. Because age and years in the U.S. were highly correlated with each other and with years of farmwork experience, they were not highly associated with categorizing injury in the small model discriminant analysis.

As seen in Table 7, 94% of those not injured were accurately classified, while only 12% of those injured were accurately classified. The three-predictor variable discriminant analysis accurately classified 75% of the cases, while the full model correctly classified 78% of the cases. Using McNemar's repeated-measures chi-square (Tabachnick & Fidell, 2001), age, years of farmwork experience, and years in the U.S. were not significantly different from using the full predictor variable model to categorize injured and not injured workers, $\chi^2(1) = 1.53$, $p > .05$. However, the full model categorized more injured correctly (26%) than the small model (12%), indicating that the additional predictor variables in the full model were helpful in the categorization of injury.

Table 6

Small Model Standardized and Structure Coefficients

Predictor Variable	Standardized Coefficient	Structure Coefficient
Age	.29	.80
Years of Farmwork Experience	.88	.98
Years in the U.S.	-.11	.83

Note: Dependent variable (0 = not injured, 1 = injured)

Table 7

Classification Results for Small Model Discriminant Analysis

Actual Group	Total	Predicted Group	
		Injured	Not Injured
Injured	109	13 (12%)	96 (88%)
Not Injured	375	23 (6%)	352 (94%)
% correctly classified:		75%	

Discussion

The purpose of this study was to identify variables predicting occupational injury among California hired farmworkers from the following predictor variables: gender, marital status, age, education, years of farmwork experience, alcohol use, drug use, years in the U.S., and resident status. Directional hypotheses were males who were younger, unmarried, with more education and less farmwork experience were more likely to be injured. Those who used alcohol and drugs were also hypothesized more likely to be injured. Directional hypotheses were not given for years in the U.S. and resident status because of a lack of previous research.

In examining the risk factors associated with injury among hired farmworkers, the variables provided a combination of support and non-support. Gender and alcohol use were the only predictors that were associated with injury in the hypothesized direction. Males were more likely than females to be injured in farmwork as found in previous research; those who drank alcohol were more likely to be injured than those that did not drink alcohol. However, all other predictors were associated with the injury in the opposite direction of what was hypothesized. Despite the reversed direction, many predictors were helpful in categorizing whether participants had been injured or not. Many of the directional differences could be associated with the current study sample compared with previous research study samples. The current study represented hired workers and not the farm owners/operators of previous research, so the differences in results may be associated with the type of worker and may not be attributable to the variables' method of collection.

In the current study, married workers were more likely to be injured than those workers who were not married. Previous research found that divorced workers were more likely to be injured (Crawford et al., 1998). Because of the small sample size of this survey, divorced workers were not separated from single or widowed workers. This lack of separation may have effected the relationship of marital status to injury, explaining the difference between the current study and previous research.

Age was also found to be associated with the categorization of injury; older workers were more likely to be injured than younger workers. Although several studies found that younger workers were more likely to be injured, some previous research suggested that older workers were more likely to be injured. Perhaps this difference in findings was associated with years of exposure to farmwork and not age specifically. As shown in the second smaller discriminant analysis, years of farmwork experience cancelled out the contribution that age made to the categorization of injury.

Education was not found to be associated with injury in the current study. Previous research, however, found that post-high school education was associated with increased risk of injury. Few within the current study sample had a post-high school education, therefore, could not be separated into their own category, which could explain the lack of findings within this study. Again, the populations examined in previous studies may differ significantly on predictors from those hired workers sampled in this study.

Years of farmwork experience preformed the opposite of what was hypothesized but these findings were similar to other research findings (Brison & Pickett, 1992).

Those with more farmwork experience were more likely to be injured than those workers with less experience. As demonstrated in the second smaller discriminant analysis, years of farmwork experience assumed a significant role in the classification of injury when inter-relatedness was accounted for among the other time related variables. Because participants were asked if they had “ever” had a workers’ compensation injury, when the injury occurred could not be determined. Thus, the injury may have occurred years ago and the participants level of farmwork experience would be quite different than what it was during the study collection period.

Illicit drug use was not significantly related to injury at all. The number of participants who had “ever” used drugs was low, so the level of current drug use would be even lower, indicating that drug use may not be a problem within this population. Because of the lack of drug use within this population, this variable could not predict injury.

Years in the U.S. and resident status were variables not found in previous injury research and were variables unique to the hired farmworker population. Those with more years in the U.S. were more likely to be injured than those workers with fewer years in the U.S. In the second discriminant analysis, years of farmwork experience was the dominant factor in classification after examining the standardized coefficients when compared with age and years in the U.S. Thus, years in the U.S. did not uniquely contribute to the classification of injury.

Documented residents were more likely to be injured than non-documented residents. This finding may be influenced by the collection of the injury variable. Injury

was defined as a “workers’ compensation injury” which may have not been understood by undocumented workers. They may not have understood what a workers’ compensation injury was, or they may not have ever filed one because of fear of deportation. So undocumented workers may have experienced work-related injuries but were unable to confirm workers’ compensation injuries.

Findings corroborated and contradicted previous research. Many of the contradictions may be attributed to methodological differences and the nature of the current sample. Although contradictions in previous research existed, many variables were associated with injury. Because of these findings, we have a general description of those hired farmworkers more likely to be injured. This information may be useful in targeting education to specific sub-populations of farmworkers who are more at risk of being injured. These at risk workers could also be targeted for assistance in receiving regular health care from government programs.

Strengths of Study

The sampling procedure of this current study was an advantage. Participants came from diverse communities across California. Because of the sampling procedure, a very clear picture of demographics associated with California hired farmworkers was established. Because a multivariate analysis was performed, the inter-relatedness of variables could be determined, allowing for a more complete assessment of the predictor variables and their association with injury. Few previous studies involving farmworkers used a multivariate approach. None of the studies using a multivariate approach focused

on variables associated with hired farmworkers. The primary emphasis in previous research was farm owners/operators.

Weaknesses and Future Study

One weakness involved concerns about the two-stage participation process. Dwellings were randomly sampled and asked to participate in the household questionnaire. All those that participated in the household questionnaire were then asked to participate in the risk behavior questionnaire. Because the participant either elected to participate in the risk questionnaire or not, a random sample no longer existed at the risk behavior questionnaire level. Thus, those who participated in the risk questionnaire may not have been representative of the population. Future research should include risk behavior collection within the first stage of the process so that the sample would be random and representative of the larger hired farmworker population.

Because of the smaller sample of those who participated in the risk behavior survey, creation of groups used in previous research could not be done. For example, because of the small number of divorced/widowed workers within the current study sample, marital status could not be grouped into the three categories of married, divorced/widowed, and single, as had been done in previous research. This change in categorization could have influenced the relationship of marital status to injury within this study compared to findings in previous research. Thus, some findings may be unique to this particular study or sample. In addition, the categorization of hired farmworker research may not fit the categorization previously used for farmworker owner/operator

research. Hired farmworker research may require further assessment to determine appropriate categorization among variables.

The collection of injury information may have also contributed to some of the unique findings. Because injury was not limited to a recent time frame, many variables that might have been associated with injury were not. Drug use may have been one of those variables. Lack of drug use in the last month was weakly associated with increased risk of injury but whether injury coincided with drug use could not be determined. So results may not reflect an actual relationship between injury and lack of drug use. In future hired farmworker research, time frames of predictor variables and the dependent variable should be the same, this allowing for a more complete assessment of the relationship between predictor variables and the dependent variable.

Conclusion

Few studies have been done examining the risk factors associated with predicting hired farmworker injury. This study identified variables associated with injury among a sample of California hired farmworkers. Although contradictions with previous research results were found, predictor variables were able to differentiate between those injured and those not injured. Those variables associated with injury may help to target appropriate hired farmworker populations with health care and education.

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Appendix
Signed Approval Forms

CALIFORNIA INSTITUTE FOR RURAL STUDIES

Agreement Between California Institute of Rural Studies and Monique Brammeier

The California Institute of Rural Studies (CIRS), supported by a grant from The California Endowment, conducted a health needs assessment of farm workers in the six major crop regions of California during 1999. The purpose of the assessment was to determine the health status of California farm workers through household interviews, physical examinations, laboratory testing for selected conditions, and a behavioral risk factor survey.

CIRS has granted Monique Brammeier, Research Analyst at the Department of Health Services, STD Control Branch, access to the CIRS data associated with the above mentioned project to complete her Thesis Project at San Jose State University within the Industrial/Organizational Psychology Master's Program.

All California Institute for Rural Studies data will be handled in a manner that will maintain respondent confidentiality and anonymity. These databases will not include name but a unique identifier. Analysis outside of the Department of Health Services, STD Control Branch performed by Monique Brammeier will be used for her Thesis Project at San Jose State University. All analyses and summary findings will be sent to David Lighthall at CIRS for review. Full acknowledgement of CIRS and The California Endowment will be included within the Thesis Project.

A handwritten signature in black ink, appearing to read "David Lighthall", written over a horizontal line.

David Lighthall, Ph.D.

Executive Director

California Institute for Rural Studies

8-28-01

Date

A handwritten signature in black ink, appearing to read "Monique Brammeier", written over a horizontal line.

Monique Brammeier

Master's candidate

San Jose State University

8/23/01

Date

San José State
UNIVERSITY

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To: Monique Brammeier
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From: Nabil Ibrahim,
AVP, Graduate Studies & Research

Date: September 20, 2002

The Human Subjects-Institutional Review Board has approved your request for exemption from human subject's review under category "D" in the study entitled:

"Occupational Injuries among California Farm Workers."

This approval is contingent upon the subjects participating in your research project or the subject's data collected for the research project being appropriately protected from risk. This includes the protection of the anonymity of the subjects' identity when they participate in your research project and concerning all data that may be collected from the subjects. The Board's approval includes continued monitoring of your research to assure that the subjects are being adequately and properly protected from such risks. If at any time a subject becomes injured or complains of injury, you must immediately notify Nabil Ibrahim, Ph.D. Injury includes but is not limited to bodily harm, psychological trauma, and release of potentially damaging personal information.

Please also be advised that all subjects need to be fully informed and aware that their participation in your research project is voluntary, and that he or she may withdraw from the project at any time. Further, a subject's participation, refusal to participate, or withdrawal will not affect any services that the subject is receiving or will receive at the institution in which the research is being conducted. This approval is granted for a one-year period and data collection beyond September 20, 2003 requires an extension request.

If you have any questions, please contact me at (408) 924-2480.

The California State University:
Chancellor's Office
Bakersfield, Channel Islands, Chico,
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