

Prevention and Resiliency: A Cross Cultural View of Farmworkers' and Farmers' Beliefs about Work Safety

JAMES I. GRIESHOP, MARTHA C. STILES, AND NINFA VILLANUEVA

Two loci of control scales were adapted to farm safety for farmworkers and farmers in California. Internal and External dimensions and hazard coping strategies were used. Searching for Safety (SS), a behavioral strategy, involves planning for hazardous events. Accepting Danger (AD), a cognitive strategy, accepts uncertainty and the unpredictability of some events. Although workers scored high on Internality, Externality was higher — this suggests that accident control is placed outside of themselves and given over to God, luck, or "bosses." Farmworkers utilized AD and SS with equal success. Farmers scored higher on Internal beliefs, thus emphasizing personal control over safety, yet acknowledging worker responsibility. They placed more faith in their planning efforts (SS) than in the mental mechanism of accepting uncertainty (AD). Factor analyses showed the two scales successfully measured Internality and Externality and two coping strategies. Suggested improvements include standardizing one scale for both groups and identifying specific behaviors and mental strategies.

Key words: farmers, farmworkers, agriculture, safety, locus of control; US, California

The agriculture industry has one of the highest injury and fatality rates of all industries — second only to mining — in the United States (US Dept. of Health and Human Services 1992). Based on the high incidence of injuries in agriculture, government agencies have mandated the implementation of on-farm safety programs (AgSafe 1992). At least in California, the issue of agricultural injuries is not simply about workplace safety for farmer and worker, but also a cross-cultural issue. California has more than 83,000 farm enterprises employing an estimated 1 million farmworkers. Many of these workers are Spanish speakers who migrate from Mexico and have limited English speaking ability. Furthermore, a growing number are limited in their ability to communicate in either English or Spanish (Grieshop 1994). Efforts to design and implement effective safety intervention programs in such contexts must consider both the complex issues of communication in the workplace and how those issues may be affected by culturally distinct belief systems.

James Grieshop, Specialist in Community Education Development, Martha C. Stiles, Staff Research Associate, and Ninfa Villanueva, Graduate Research Assistant. All three are in the Department of Human and Community Development at the University of California, Davis. This research was funded by National Institute of Occupational Safety and Health grants UOS/CCU906055-01-03 and UO7/CCU906162. Send correspondence to Dr. James I. Grieshop, Dept. of Human and Community Development, University of California, Davis, CA 956416.

In this study the beliefs of two culturally distinct populations (California farmers and Hispanic/Latino farmworkers) regarding control of agricultural workplace injuries and accidents were examined.¹ In the past three decades the locus of control construct has been used widely in studies related to illness and personal behaviors. To date, however, few studies have examined workplace injuries² in agriculture. This study was motivated both by the need and opportunity to adapt the locus of illness control to the areas of injuries and accidents in agriculture and by the need to develop and validate locus of injury control scales with typical groups of farmers and farmworkers. As such, it contributes to the understanding of locus of injury control (LIC) and of the impacts of culture relative to injury *cum* accident beliefs.

Starting in the early 1960s with a study (Seeman and Evans 1962) on patients hospitalized for tuberculosis, the health locus of control (HLC) has been applied to a variety of areas and has been changed and adapted to fit each application. Wallston *et al.* (1976) attempted to operationalize health locus of control beliefs by viewing those measures as valuable for predicting healthy and unhealthy behaviors of persons who expressed internal locus of control beliefs versus external focused beliefs. Based on Levenson's work (1973, 1974, 1975), Wallston and Wallston (1978) developed the multidimensional health locus of control (MHLC) scales consisting of items examining control related to Internality, Externality, and Powerful Others (I-E-PO). These factors have been explained as follows: Internality: when a person perceives that a reward is a direct result of his/her action; and Externality: when the reward is deemed independent of the person's actions and in some cases the reward

is perceived as result of another person's efforts or power (Powerful Other) (Rotter 1966). Variations on these measures have been used in many health-related studies such as smoking habits (Clarke 1982), use of seat belts (Desmond *et al.* 1985), eating behaviors (Hayes 1987), exercise (Laffrey 1983) and use of alcoholic beverages (Russell 1983). In addition, a small number of studies (Coreil and Marshall 1982; Logan 1991) have investigated the phenomenon on a cross cultural basis, while using the dimensions of prevention and cure.

If the illness/injury dimensions are valid, then the health locus of control construct should be a tool useful for the design of programs to modify health-related behaviors of specific groups. However, as Wallston and Wallston (1978) suggest, locus of control measures must first be refined and operationalized in order to use the information with confidence for the purposes of program design and implementation. This suggestion was also an impetus for this research.

It was hypothesized that two distinct, and possibly opposing, belief systems regarding responsibility, action, blame, intervention, etc. potentially influence attitudes and behaviors of farmers and farmworkers toward safety. Locus of injury/accident control scales were developed to examine such differences. These scales were modeled after previously used multidimensional health locus of control scales (Wallston *et al.* 1976). Coreil and Marshall (1982) introduced the cross-cultural aspect to locus of illness control research in their study that compared Haitians living in Haiti and Appalachians residing in the United States. Their rationale for group comparisons was, in part, to dispel the myths of:

overgeneralizations about the peasant personality, variously characterized as fatalistic, distrustful of outsiders, resistant to change, lacking future orientation, and deficient in achievement motivation. The implicit referent of comparison in these descriptions has invariably been middle-class Anglo Americans, yet lower-class Anglos, Hispanics, Blacks and Appalachians have also been characterized by this description. Also, the notion that because peasants are fatalistic and present-oriented, preventive medicine plays an unimportant role in their health behavior." (Coreil and Marshall, 1982:131)

They measured two perceptions of control of illness: *prevention* (the ability to prevent illness) and *cure* (the ability to cure or treat illness) with medical intervention. In addition, they included the factor of *direction* (i.e., Internal-External). Logan (1991), in a study conducted with Brazilian herbalists, found that traditional herbalists demonstrated externality on disease prevention and internality on cure, the opposite responses were found for Appalachians and Haitians, groups presumed to be culturally different from Brazilian herbalists.

The cross-cultural dimension incorporated in this study reflects the current reality of California agriculture. The majority of farm owners and operators are American English speaking Anglos with relatively high levels of formal education. In contrast, most farmworkers in California are non-Anglo, principally of Mexican descent. Most speak only Spanish and have relatively low levels of formal education mainly from Mexican schools. Farmers and workers are distinguishable from one another culturally, economically and on the basis of power. In agriculture, the farmer owns and controls the workplace and decides who works there. However, these two groups regularly

come into contact through work and share a concern for workplace health and safety. They deal with the issue of safety in different ways. For example, the farmer may work in a managerial and/or supervisory capacity, while farmworkers perform what is often referred to as the "hard work." Workers often suffer serious and debilitating illness in the fields, while farmers/owners, who less frequently endure such injuries, suffer the financial and economic effects of worker injuries due to higher insurance rates. Presumably, the desired result of work safety training for both groups is to avoid and reduce injuries and illness. If injuries can be reduced, partially through the implementation of well conceived and effective educational programs, both workers and owners benefit. Important questions remain however. Do cultural differences and workplace power issues influence locus of injury control beliefs? If locus of control beliefs for these groups are significantly different, what does this situation imply for those designing health promotion programs? These questions were central to this study.

The Internal-External-Powerful Other directional factors originally used by Coreil and Marshall (1982) were retained. However, while Coreil and Marshall also used the dimensions of Prevention and Cure, "cure" was judged to be insufficient or irrelevant for measuring injury/accident beliefs. Where prevention is undeniably related to injuries (or accidents) the concept of "cure" is not as clearly related. Therefore, two other measures related to locus of injury control were utilized: Searching for Safety (or the ability to create a hazard-free system, to prevent accidents through anticipated action) and Accepting Danger (or the belief in one's ability to be resilient and/or to avoid or escape hazards as they occur) (cf. Wildavsky 1988). The Searching for Safety factor is based on anticipation, the goal of which is to predict and prevent potential dangers before their effects occur. The basis for this is action—a preventive behavior approach. Accepting Danger relies on the mental strategy of coping, reacting or being resilient in the event of hazard. It is the "capacity to cope with unanticipated dangers after they have become manifest" (Wildavsky 1988). The basis for Accepting Danger is understanding and/or accepting that harmful events can and will occur even when all known precautions have been taken. The notion of uncertainty underlies this Searching-Accepting (or preventive anticipation-coping resiliency) distinction. Regardless of how thoroughly a farmer or worker plans or anticipates potential work hazards, absolute prediction of harmful events and consequences is impossible—uncertainty is never reducible to zero.

The question is: do farmers and farm workers differ in their levels of anticipation and resiliency where workplace safety is concerned? How do they perceive the effectiveness of the safety strategies of Searching for Safety versus Accepting Danger?

Separate questionnaires were developed and tested for each sample. Although both questionnaires (see Tables 1 and 2) were designed to measure locus of injury control beliefs, two different scales and questionnaires were used. While some scale items were identical and comparable, others were not. For instance, references to specific external powers (e.g., worker compensation or insurance representatives) were relevant only to farmers. On the other hand, reference to external powers such as farmer, supervisor, or God were included on workers' questionnaires. Other differences are noteworthy. The farmer scale consisted of 18 locus of injury control (LIC) items in English, while the worker scale had 15 LIC items in Spanish.

Field testing of each set was performed with individuals representing the targeted groups. Reliability testing of the Searching and Accepting strategy items and directionality items indicated inter-rater reliability ranging from 100% for the Internal-External direction for both groups to a low of 90% for the Searching-Accepting strategies.

Methods

The two independent but related studies are discussed and referred to as one. Sample one consisted of 302 Mexican/Mexican-American farmworkers, while 399 California farm owners/operators constituted sample two. Some farmworker participants were employed by the farmer respondents; most were not. It is believed that both samples are typical of the population of Hispanic farmworkers and farmers working in California's Central Valley. Over one million farmworkers toil annually in California and represent not only a diverse Mexico, but many Central American countries. Consequently, it is daunting to say what constitutes a representative sample. However, a comparison of this group with those discussed in other works (see Palerm 1991; Martin 1992) suggests that this sample is typical of the California farmworker population. Similarly, the farmer sample is typical of the larger farmer population (US Department of Commerce 1987).

Five federally-managed migrant labor camps located in three California Central Valley counties were selected as sites for collecting farmworker data. Trained bilingual interviewers traveled to camps at night and on weekends when workers were available in their dwellings. Workers were approached in each dwelling unit to engage one adult from the household to participate in the study. Each camp contained 70-95 housing units. While the goal was to interview one adult resident from each unit, between 60-90% of the units were ultimately represented. Farmworker responses were collected through face-to-face interviews conducted in Spanish. Questions were read from a previously tested procedural guide/questionnaire; responses were recorded in writing.

Responses for the 399 farm owner and supervisor respondents were collected by two methods. First, written questionnaires were distributed and completed at two farm expositions held in California's Central Valley. A total of 209 surveys were returned with 97 (46%) from eligible farmer/supervisor respondents. The second method used mailing lists from Cooperative Extension offices in the same region. Of the 1,162 surveys mailed to farm operations, 333 (29%) were returned of which 302 (26%) were usable.

The 34-item farmworker instrument was pretested in Spanish at two sites similar to those used for the actual study. Questions addressed occupation, safety history, age, gender, number of children, and education, in addition to the 15 locus of injury control scales questions (Table 1), each with 5-point Likert-type response scales ("strongly agree"= 5 points through "strongly disagree"= 1 point). During the interviews workers were shown five cards in Spanish describing each response choice. Respondents were asked to give their response by either pointing to the one card that reflected their agreement or by stating the degree of agreement. The 29-item farmer survey included background questions similar to the worker's along with an 18-item locus of injury control section (Table 2).

Table 1. Mean & Percent Responses to WORKER: Locus of Injury Control Items by Dimension

Question	I-E-O-F S-A*	Mean	Agree ^b (%)	Neutral (%)	Disagree ^b (%)
1. The main thing which affects safety in your job is what you yourself do.	I S	3.76	65.3	14.3	20.4
2. If the Lord wants you to have an accident, there's nothing you can do to stop it.	E-F A	3.95	71.4	7.0	21.6
3. Regarding safety in your job, you can only do what the supervisor/farm owner tells you to do.	E-O A	4.09	76.7	9.7	13.7
4. If you have an accident at work, it's your own fault.	I S	1.80	11.2	13.2	75.5
5. There is no point in worrying about accidents. What will be will be.	E-O A	2.60	36.4	10.3	53.4
6. When you have an accident in your workplace it's because you weren't paying attention.	I S	2.41	29.4	12.9	57.7
7. Most people have accidents at work because they are carelessness.	I A	2.84	35.8	22.2	42.0
8. When there is an accident at work supervisor/farm owner is to blame.	E-O A	2.26	17.6	22.8	59.6
9. Luck plays a big part in determining whether there will be an accident at work.	E-F A	3.38	55.3	12.3	32.4
10. You cannot prevent accidents unless the supervisor/farm owner keeps the workplace safe.	E-O A	3.90	72.0	9.3	18.7
11. Some people have accidents at work while others avoid them.	E-F S	3.69	59.7	17.7	22.6
12. Most workplace accidents can be avoided by proper training.	E-O S	4.48	87.7	6.6	5.6
13. No matter how safe your workplace is, you are responsible for your own safety.	I S	4.09	76.5	8.3	15.2
14. Modern technology will find a way to prevent most workplace accidents.	E-F A	3.85	59.2	31.4	9.4
15. If God wants an accident to happen to me at work, it will happen.	E-F A	4.16	76.8	8.6	14.7

*I=internal; E=external; O=ext. Powerful Other, F=ext. Powerful Force; S=Searching for Safety dimension; A=Accepting Danger dimension; ^bstrongly agree & agree; ^cdisagree & strongly disagree; strongly disagree=1 and strongly agree=5

Possible responses to these items used the same 5-point Likert-type scales. For both instruments, the locus of injury control variables were designed to measure the strategies of Searching for Safety and Accepting Danger and the directions of Internal and External.

Results

The Farmworker Sample: The 302 farmworkers had a mean age of 36 years and over half were female (58.5%). Farmworker males were slightly older (mean=39 years) than the females (mean=33.7 years). Nearly all respondents were born (92.4%)

Table 2. Mean & Percent Responses to FARMER: Locus of Injury Control Items by Dimension

Question	I-E-O-F S-A*	Mean	Agree ^a	Neutral	Disagree ^b
			(%)	(%)	(%)
1. When I make a safety plan, my behavior determines how well it will work.	I S	4.37	86.6	9.6	3.8
2. No matter what I do, if there's going to be an accident there will be an accident.	E-F A	1.84	7.9	15.9	76.3
3. Having regular contact with my workers comp. rep. is the best way to avoid injury on my farm.	E-O S	2.66	20.5	36.1	43.3
4. Most things that affect workplace health and safety happen by accident.	E-F A	2.30	20.1	18.2	61.7
5. Whenever I have a safety problem on my farm, I should consult my workers comp. rep.	E-O S	3.22	39.5	34.3	26.3
6. I am in control of safety on my farm operation.	I S	4.12	76.2	17.3	6.4
7. My workers have a lot to do with the workplace being hazardous or safe.	E-O A	4.37	85.1	11.3	3.6
8. When there is an accident, I am to blame.	I S	2.74	21.6	38.6	39.7
9. Luck plays a big part in determining if there will be an accident or illness.	E-F A	1.99	10.0	18.8	71.3
10. Safety laws and regulations control my workplace safety.	E-O S	3.17	38.9	32.7	28.4
11. When my workplace is accident or illness free. It is because I am lucky.	E-O A	1.87	8.1	13.1	78.8
12. The main thing which affects safety in my workplace is what I myself do.	I S	3.83	67.4	21.8	10.8
13. If I take care of the work environment on my farm, accidents can be avoided.	I S	4.17	82.1	12.9	5.0
14. When I correct workplace hazards, it is usually because others (workers' comp rep, farm advisor) advised me well.	E-O S	3.16	39.7	33.5	26.8
15. No matter what I do, there is likely to be an accident or injury in my workplace.	E-O A	2.80	21.6	23.7	54.8
16. If it is meant to be, my farm operation will remain safe.	E-F A	2.23	17.3	17.1	65.7
17. If I take the right actions, my workplace will be safe.	I S	4.31	86.2	10.9	2.9
18. Re: farm safety, I can only do what my workers comp. rep. tells me to do.	E-O A	1.61	6.3	6.5	87.2

*I=internal; E=external; O=ext. Powerful Other, F=ext. Powerful Force; S=Searching for Safety dimension; A=Accepting Danger dimension; ^astrongly agree & agree; ^bdisagree & strongly disagree; strongly disagree=1 and strongly agree=5

and educated (83.4%) in Mexico. Two-thirds had six years or less of formal schooling while only 4% of the sample had completed high school. Spanish was their primary language: 76.5% spoke, 78.8% read, and 81.1% wrote only Spanish. They had lived in the United States an average of 15.7 years and had worked in agriculture for over 12 years. Most (77.2%) were employed by labor contractors and as temporary workers (97.7%), and averaged only 5.8 months of work per year. Of the 302 workers interviewed, 42.6% reported they had experienced work injuries and/or illness in the past five years. Skin rashes, nausea, allergic reactions, back injuries, cuts, and bruises were commonly reported. At the same time, 98% of this farmworker group did not receive health insurance from employers, and 99.7% had no personal insurance. Only 11.6%

of this sample reported receiving safety training of any kind in the previous year. No significant differences were found on the basis of gender of the respondents.

The Farmer Sample: Most of the farmers (n=399) were male (87.2%) with a mean age of 43.9 years. Nearly 80% of the sample had completed high school, 60% had gone to college, and over 20% had completed graduate school. Respondents were farm owners (41.4%), farm managers or supervisors (34.3%), and labor contractors or a combination of categories (22.1%). Over one-third (37.6%) of the operations farmed 500 acres or more. The largest enterprise was 80,000 acres and the average was 1,162 acres. Most farm operations (68.9%) employed 49 or fewer permanent workers (working eight months or more per year) and 58% hired 49 or fewer temporary workers. A sizable minority (39.5%) hired workers through contractors. Most of the farmers (83.9%) reported not offering insurance to temporary workers; however, just over half (55.7%) did provide insurance for permanent employees. With regard to safety programs in place on their farms, 81.2% said they used written safety plans or manuals, 67% held monthly meetings, 25.3% had safety committees or officers in charge of programs, and 13% reported having no safety programs in place.

Farmworker Locus of Injury Control Beliefs: The locus of injury control (LIC) items examined farmworkers' beliefs about responsibility for workplace injuries. Items were divided between Internal (5 items) and External (10 items) questions. The External questions were further sub-divided into Powerful Others and Powerful Forces. The work safety strategies were distributed between Searching for Safety (6 items) and Accepting Danger (9 items). Scores for individual questions were summed to create a mean value for each of the four dimensions of Internal, External, Searching for Safety, and Accepting Danger.

A pervasive external belief system regarding workplace injury and illness on the part of farmworkers was manifested. The high External mean response contrasts with the low mean score for Internal control (363 vs. 298; $p < 0.0001$) (see Table 3). This result suggests a high level of attribution of responsibility outside of one's self for workplace safety versus feeling personally responsible. When the External dimension is divided into Powerful Others (e.g., training, technology, supervisors, and farmers) and Powerful Forces (e.g., God, chance, or luck), the perceived control by Powerful Others is significantly less than by Powerful Forces (mean = 3.47 vs. 3.80; $p < 0.0001$). Differences between farmworker responses for Searching for Safety (mean = 3.41) and Accepting Danger (mean = 3.41 and 3.42, respectively) were negligible. These scores suggest that workers adhere to both strategies; Searching for Safety (prevention) and Accepting Danger (resiliency) are belief systems related to the views that accidents are preventable and, at the same time, that not all hazards can be prevented or avoided. This dual belief system is reflected in scores for individual items. For example, high level of agreement is revealed between Searching for Safety Item 12 (mean = 4.48) and Accepting Danger Item 15 (mean = 4.16). On Item 12 workers expressed confidence in proper safety/job training as an injury prevention strategy. On the other hand, in the Accepting Danger domain (see Item 15), workers express belief in the inevitability of accidents and that such events are due to the will of God.

Table 3. Farmworker Locus of Control: Factor Analysis Table (Oblique Solution Primary Pattern Matrix-Orthotran Narimax)

Question Number	Factor Number							
	1	2	3	4	5	6	7	8
1	0.014	-0.031	0.004	0.043	-0.008	0.025	0.953	0.080
2	0.545	-0.316	-0.283	0.260	0.333	0.033	-0.075	0.269
3	0.396	-0.049	0.070	-0.241	0.042	0.542	-0.047	-0.182
4	-0.160	0.731	0.005	0.063	-0.159	0.097	-0.069	0.168
5	0.517	0.419	-0.024	-0.032	-0.340	0.041	-0.124	0.228
6	0.045	0.729	0.113	0.127	0.191	-0.266	0.008	-0.082
7	-0.029	0.633	-0.118	-0.060	0.451	0.136	0.109	-0.121
8	0.002	0.129	0.100	0.901	-0.001	0.035	0.043	-0.227
9	0.766	0.091	0.054	-0.133	-0.072	-0.046	0.267	-0.153
10	-0.079	-0.005	0.019	0.128	0.002	0.898	0.046	0.093
11	0.012	0.058	0.109	0.001	0.793	0.004	-0.024	0.124
12	-0.014	-0.074	0.724	-0.014	0.216	0.058	0.008	0.135
13	0.028	0.077	0.127	-0.225	0.093	0.010	0.092	0.826
14	-0.001	0.084	0.839	0.100	-0.111	-0.024	-0.013	-0.013
15	0.807	-0.143	0.020	0.086	0.072	0.002	-0.190	0.076

Farmworker Locus of Injury Control Beliefs: The 18 item Farmer LIC questionnaire consisted of six Internal and 12 External items, divided between Powerful Others and Powerful Forces. The farmer questions were also divided between Searching for Safety (10 items) and Accepting Danger (8 items).

As predicted, farmers were significantly more internally versus externally (mean = 3.92 and 2.56, respectively; $p < 0.0001$) oriented regarding work injury prevention (Table 3). They expressed strong agreement with propositions affirming individual control over managing and maintaining safety in their workplaces. For instance Items 1 (mean = 4.37), 13 (mean = 4.17), and 17 (mean = 4.31) stress the high levels of Internality or acceptance of personal responsibility for preventing work hazards. The External dimension was subdivided into Powerful Others (e.g., workers compensation and insurance representatives and workers) and Powerful Forces (luck, fate, chance). The difference in means (2.75 vs. 2.04; $p < 0.0001$) was statistically significant. Both low mean scores are interpreted as rejection of the belief that such forces as persons or fate external to the farmer him/herself influence the incidence of injury or the level of safety in his/her workplace. Low mean responses to Item 2 (mean = 1.84) and Item 11 (mean = 1.87) support the proposition that luck, fate, or chance are not viewed as controlling agents of safety. Farmers also believe that, compared to his/her own personal level of control, selected Powerful Others (e.g., insurance and workers' compensation representatives, farm advisors) have only a slight edge over Powerful Forces. Questions 3 (mean = 2.66) and 18 (mean = 1.61) illustrate this point.

The comparison of results for Searching for Safety and Accepting Danger suggests the farmer sample clearly relies on the former. For the Searching for Safety strategy (i.e., anticipation-prevention) the mean composite score (3.34) was significantly different ($p < 0.0001$) from the Accepting Danger (or resilience) mean score (2.39). In Items 1, 13, and 17, farmers believe that by taking corrective action prior to the occurrence of accidents, injuries can be avoided. On these items, reflecting prevention and anticipation, farmers scored the highest — scores are above 4 on a 5 point scale. On the other hand, farmers

Table 4. Farmer Locus of Control: Factor Analysis Table

Question Number	Factor Number								
	1	2	3	4	5	6	7	8	9
1	0.064	0.044	0.070	0.042	-0.021	-0.020	0.012	0.903	-0.062
2	-0.051	0.029	-0.043	0.094	-0.122	-0.080	0.083	0.052	0.792
3	-0.014	0.863	-0.049	-0.018	-0.133	0.027	-0.109	-0.034	0.134
4	-0.042	0.008	-0.053	0.011	0.064	-0.059	0.822	0.117	0.009
5	0.063	0.681	-0.128	0.007	0.134	0.051	0.102	0.053	-0.208
6	-0.142	-0.100	0.826	0.201	0.001	-0.011	0.110	-0.057	-0.082
7	0.176	0.003	0.162	0.882	0.077	0.063	-0.109	0.013	-0.014
8	0.404	0.056	0.268	-0.552	0.165	0.039	-0.332	-0.042	-0.161
9	0.673	-0.081	-0.25	0.058	-0.033	0.103	0.128	0.106	0.084
10	-0.047	0.031	-0.018	0.021	0.907	0.004	0.064	-0.043	-0.014
11	0.800	0.088	0.108	0.008	-0.061	-0.134	0.008	0.012	0.006
12	0.111	-0.002	0.623	-0.183	-0.010	0.215	-0.019	0.306	0.116
13	0.039	0.102	0.158	0.151	-0.073	0.792	0.007	-0.146	-0.065
14	-0.141	0.454	0.107	-0.011	0.369	0.119	0.051	0.191	0.248
15	0.287	0.003	0.020	-0.085	0.241	-0.053	-0.034	-0.121	0.648
16	0.263	-0.121	0.115	0.005	-0.004	0.312	0.547	-0.087	0.260
17	-0.095	0.005	-0.074	-0.085	0.085	0.808	0.027	0.129	-0.032
18	0.179	0.432	0.216	-0.046	0.031	-0.172	0.515	-0.247	-0.150

disagreed with the strategy of Accepting Danger (Items 2, 11, and 18), which received the lowest scores — all below 2.00. These results demonstrate a lack of faith in the effectiveness of a workplace safety strategy that is based on a lack of preventive efforts.

FACTOR ANALYSIS

A goal of this study was to develop and test a Locus of Injury Control Scale in a cross cultural context. To test this exploratory Locus of Injury Control Scale, factor analyses were run for both Workers and Farmers using Principal Components Analysis Extraction Method and the Varimax solution (Hinkle *et al.* 1979; Mulaik 1972).

The analysis that follows focuses on questions of the relationship between the principal components and the original variables (Daultrey, 1976). Using the Varimax rotation criterion allows each variable to load highly on one factor only; that is, it maximizes the variance of loadings on each factor (Goddard and Kirby 1976). Tables 3 and 4 show the factor analysis scores for Workers and Farmers, respectively, and Table 5 contains the eigenvalues for each group. From analysis of the 15-item Worker instrument eight factors emerged. No internal items overlapped with external items. The Searching for Safety and Accepting Danger dimensions also factored cleanly with but two exceptions (Factors 2 and 3) for Workers. For the Farmers, nine factors were revealed for the 18-item Farmer questionnaire. With the exception of Factor 4, Internal and External dimensions factored independently of each other. Searching for Safety and Accepting Danger also withstood the test with only Factors 2 and 4 showing overlapped items.

Workers: Five of the eight Worker factors were external (Table 3). Items 2,5,9, and 15 (all referring to "God" or "luck" as controlling powers) loaded onto Factor 1 and were all External-Accepting Danger questions. This result may suggest that, for these workers, the utilization of the Accepting Danger coping strategy is inextricably linked with the belief in God's

Table 5. Eigenvalues and Proportion of Original Variance

Value	Farm Workers		Farmers	
	Magnitude	Variance Prop.	Magnitude	Variance Prop.
1	2.601	0.173	3.127	0.174
2	1.886	0.126	2.262	0.126
3	1.415	0.094	1.419	0.079
4	1.185	0.079	1.235	0.069
5	1.022	0.068	1.101	0.061
6	0.963	0.064	0.923	0.051
7	0.923	0.062	0.913	0.051
8	0.816	0.054	0.868	0.048
9			0.836	0.046

intervention and the role luck plays in daily life. From the external control work safety perspective it is important to "know" that an omnipotent oversees activities, a fact that appears to be readily accepted by these workers.

Externality appears in Factor 3 where Items 12 and 14 and in Factor 6 where Items 3 and 10 were of primary significance indicating that training and technology and supervisors and farmers are viewed as outside powerful forces. Factors 4 and 5 each contain one item, indicating that "blaming others" and "chance" are viewed as powers outside of oneself. The three remaining factors (2, 7, and 8) reflect the internal nature of on-the-job carelessness or personal blame, personal actions and personal responsibility. Accepting blame after an accident occurs is rejected by workers, although accepting responsibility for taking actions to be safe is acceptable.

Farmers: Five of the nine Farmer factors are external (Table 4). A sixth is mixed Internal-External (Factor 4). Farmers Factor 1, also External-Accepting Danger, is linked with the role of luck in work safety. Items 9 and 11 loaded to Factor 1 indicating that Farmers also view "luck" as an external force, yet an unacceptable coping strategy for maintaining a safe work environment. Factor 2 loaded with four items all focusing on the powerful other workers' compensation representative. Laws and regulations (Factor 5) were seen as external as were chance (Factor 7) and fate (Factor 9). Internal issues were personal control (Factor 3), personal actions (Factor 6) and the power of planning (Factor 8).

Discussion

This exploratory study operationalized locus of illness control measures by adapting them to workplace injuries in agriculture. Results suggest that the Latino/Hispanic farmworkers were highly External in their perception of responsibility for work safety. That is, they tended to identify God, luck or the boss as entities controlling work accidents and safety maintenance. On the other hand, the Anglo farmers were internally controlled, maintaining the belief that work safety outcomes are contingent upon their intentions, choices, and behaviors. Farmworkers, however, utilized both coping strategies, Searching for Safety and Accepting Danger, while the farmer group did not embrace Accepting Danger. Several explanations of these differences have been examined.

The complexity of the process of perception is illustrated by the concurrently held belief systems of workers and farmers.

Workers believe that God and luck play a substantial role in outcomes regarding work safety, yet they also believe their personal actions can reduce injuries. Farmers believe in their individual powers to eliminate or reduce workplace accidents, yet they grant power to workers and regulatory agents. Scientists and other students of human behavior have labeled some responses as "inward" or "fatalistic" and have interpreted them as "passive" and "withdrawn" - as giving up control. Rothbaum *et al.* (1982) believe that vacillation between the two systems is a normal function of our perception and belief processes. They also believe that the attributions and the behaviors associated with externality (inwardness, fatalism, and passivity) often reflect a type of perceived control generally overlooked. People attempt to gain control not only by bringing the environment into line with their wishes (primary control) but also by bringing themselves into line with environmental forces (secondary control). Neither process exists alone as both are intertwined and secondary control is described as a proactive means of coping rather than as giving up. Two types of secondary control which may be relevant to this study of farmers and workers are vicarious control and interpretive control. Attributions to powerful others permit vicarious control when one identifies with the "others". Submission to a powerful leader or deity often enables the person to join in their power. Any attribution to God, luck, chance or others may enable workers to derive meaning from otherwise uncontrollable experiences and events. This ability to interpret events to glean better understanding and to accept them is interpretive control (Rothbaum *et al.* 1982).

The factor analyses further suggested that distinct, but not totally dissimilar, world views are at work in the belief systems of these workers and farmers. The issues of "God" and "luck" are illustrative. Although the differences in cultures may be influential in the respondents' views of accepting danger, it would be and is unfair to characterize workers as simply accepting fate and farmers as failing to "check on or trust in God." Workers do not blindly, nor passively accept danger or injury; rather it may be that they distinguish between imminent and non-imminent danger. Furthermore, there appears to be the acceptance on their part that uncertainty exists, or that absolute certainty in the sense of controlling the environment is an impossibility. The unexpected happens even when you plan and anticipate. What occurs is an acknowledgment of a version of Murphy's Law (Bloch 1991), which may be expressed as: "if anything does go wrong, it's the will of God" rather than "if anything can go wrong, it will." On the farmers' side, there exists a strong belief in anticipation followed by planned preventive behaviors in an effort to reduce or eliminate uncertainty. Accepting that zero-level uncertainty is not a possibility does not fit into the farmers' world view of risk control.

While this study indicates that a strong externality pervades farmworkers' belief systems and internality persists among the Anglo farmers, the dangers of stereotyping must be addressed:

The repeated attribution of a wide range of behaviors to (acceptance of divine intervention) has engendered a reified and monolithic view of fatalism as the master value of the poor. As a result, significant differences in perceptions of control over the world that exist within the 'culture of poverty' have been obscured" (Coreil and Marshall 1982:132).

Previous studies have shown that External and Internal belief orientations are associated with ethnicity and that externality is manifested by degrees of fatalism and passivity. In other research, Mexicans, Mexican-Americans, and Blacks were found to be less Internal than Anglos (Madsen 1973; Mirowsky 1984; Roueche and Mink 1976). However, Garza and Ames (1974) reported that poverty is associated with externality and that Mexican-Americans' strong External beliefs are due to their socioeconomic status. Guagnano *et al.* (1986) also found that higher Internal scores were associated with family income rather than ethnicity. They suggest that when age, gender, income, and education are controlled, there are no differences among the internal scores of Blacks, Hispanics and whites.

As Vaughn and Nordenstam (1991) point out, adaptation to risks is influenced not only by the hazard itself, but also by the characteristic ways individuals approach the risky situation. Differences between group perceptions of risk or control over hazards are explained in part by value and belief systems and by past experiences (Weinstein 1989, 1985). In addition, the literature consistently reports significant differences in levels of risk perception and control over self-protection among ethnic groups (Pilisuk and Acredolo 1987; Price *et al.* 1988). This is explained by the unequal distribution of exposure to potentially hazardous situations across ethnic groups, which serves to influence each group's life experiences, which, in turn, affects levels of risk perception and perceived control over such events.

Other work has examined occupational hazards and ethnicity. If personal experiences impact beliefs about personal control, one's daily work situations make a substantial contribution to an individual's belief system:

Due in part to language barriers, sociopolitical factors, and cultural differences, particularly hazardous occupations may contain a disproportionate number of individuals from certain ethnic groups. Those employed as migrant farm workers, for example, are largely of Hispanic descent...and the occupation has one of the highest disability rates of any job...This differential exposure may account, in part, for differences in risk perception among members of ethnically diverse groups, because prior experience can influence the subsequent evaluation of risk. (Vaughn and Nordenstam 1991:45-46)

Although the locus of injury control scales have helped to identify farmer and worker characteristics and coping strategies, these categories may be too simplistic to thoroughly explain complex belief systems. This point is especially true where apparent conflicting rationales (such as beliefs associated with health, illness, and injury) coexist and are manifested concurrently. Persistent externality may be a result of the cultural milieu in which this farmworker sample has been conditioned in the US as well by the realities of their current work situation where farm operators control the environment. Under such circumstances, it would be inaccurate to describe workers as fatalistic and passive versus realistic yet compliant. Scores on two of the five Internal questions stressing personal control over the safe work environment indicate neither fatalism nor passivity. Farmworkers were eclectic in coping strategies—Searching for Safety is a proactive means for responding to predictable harm. Taking preventive measures to alter potential outcomes is part of this coping mechanism. At the same time, Accepting Danger allows the worker to acknowledge that all dangers are neither predictable nor controllable. Workers scored

high on both strategies, suggesting a balance between anticipation and resiliency. Even though the farmers' internality was dominant, they also agreed with four of the ten External items. They restrict their coping tools to Searching for Safety, choosing to plan and prevent accidents while rejecting the Accepting Danger strategy.

Even though most factors loaded cleanly on the internal and external dimensions, the locus of injury control scale will benefit by refinements on both Worker and Farmer questionnaires. First, in order to compare across groups, both instruments must have identical internal and external items. The Farmer group was not directly asked about the roles God or carelessness or training in workplace safety. The Worker group was not asked about worker's compensation representatives. However, the latter question may be unimportant since workers likely are unaware of these representatives.

Second, Factor 4 for Farmers contained both internal and external items. Further exploration into this anomaly may yield an interesting insight into this sample's perceptions. Some items were single-question factors and would be stronger measures if other items were designed and paired with them. As the instrument stands now, coping strategies and internality and externality were successfully measured. However, further development and field work would undoubtedly produce a more robust tool.

How can locus of injury control assist in workplace injury prevention programming? As Logan (1991) points out, major illness and accident reduction can be accomplished by emphasizing prevention when training workers and stressing that the individuals have control over their own well-being at work and at home. Understanding that farmworkers have External tendencies is useful knowledge for clinicians, safety trainers, and employers responsible for injury reduction and maintaining safe working environments. Personal preventive behaviors, then, must be emphasized in trainings. As personal injury prevention behaviors are learned and tested by individuals and are perceived as successful, similar behaviors will be adopted by workers so that injuries can be avoided. If the lack of perceived control over one's fate at work is a barrier to self-protection, the employer has the responsibility and obligation to "empower" the worker. Appropriate safety equipment and proper training are necessary to arm any worker exposed to numerous hazards. If the workers, however, are inclined to externalize control, training must be presented in a fashion so as to increase the workers' physical and mental abilities to protect themselves. Identifying and understanding the sources and foundations of individual and group differences regarding personal control over injury is essential as the government and employers attempt to engage workers as partners in on-the-job hazard management.

NOTES

¹ This research involved two independent studies on the same topic. For purpose of efficiency, the two studies will be referred to in the singular — study.

² The term "accident" is not used to describe injuries or illness at work since it connotes the idea of "unavoidability." In 1991 the National Institute of Occupational Safety and Health (NIOSH) ceased using "accidents" as it was determined that all injuries are avoidable. Regardless, in the study reported here "accident" is used to refer to injuries.

REFERENCES CITED

- AgSafe
1992 Occupational Injuries in California Agriculture 1981-1990. AgSafe Coalition for Health and Safety in Agriculture. Publication, Berkeley: Univ. of California, School of Public Health.
- Bloch, A.
1991 The Complete Murphy's Law. Revised Edition. Los Angeles: Price Stern Sloan.
- Clarke, John, H., Brian V. Macpherson, and David R. Holmes
1982 Cigarette Smoking and External Locus of Control Among Young Adolescents. *Journal of Health and Social Behavior* 23:253-259.
- Coreil, Jeannine and Patricia A. Marshall
1982 Locus of Illness Control: A Cross-Cultural Study. *Human Organization* 41(2):131-138.
- Daultrey, Stu
1976 Principal Components Analysis. Concepts and Techniques in Modern Geography Series No. 8, Geo Abstracts Ltd. Norwich: University of East Anglia.
- Desmond, Sharon, John H. Price, and Katherine O'Connell
1985 Health Locus of Control and Voluntary Use of Seat Belts Among High School Students. *Perceptual and Motor Skills* 61:315-319.
- Garza, Raymond T. and Russell E. Ames
1974 A Comparison of Mexican-American and Anglo College Students on Locus of Control. *Journal of Consulting and Clinical Psychology* 42:919.
- Goddard, John and Andrew Kirby
1976 Introduction to Factor Analysis, Concepts and Techniques in Modern Geography Series No. 7, Geo Abstracts Ltd. Norwich: University of East Anglia.
- Grieshop, James
1994 Oaxacan Migration and Community Change: What Goes Up May Come Down. Paper presented at Latin American Community Development Symposium, Lewis and Clark College, Portland Oregon, Jan. 24-29.
- Guagnano, Gregory, Curt Acredolo, Glenn R. Hawkes, Steve Ellyson, and Nancy White
1986 Locus of Control: Demographic Factors and Theft Interactions. *Journal of Social Behavior and Personality* 1(3):365-380.
- Hayes, Diane and Catherine E. Ross
1987 Concern with Appearance, Health Beliefs, and Eating Habits. *Journal of Health and Social Behavior* 28:120-130.
- Hinkle, Dennis E., William Wiersma, and Stephen G. Jun
1979 Applied Statistics for the Behavioral Sciences. Chicago: Rand McNally College Publishing.
- Laffrey, Shirley C. and Michael Isenberg
1983 The Relationship of Internal Locus of Control, Value Placed on Health, Perceived Importance of Exercise and Participation in Physical Activity During Leisure. *International Journal of Nursing Studies* 20:187-196.
- Levenson, Hannah
1973 Multidimensional Locus of Control in Psychiatric Patients. *Journal of Consulting and Clinical Psychology* 41:397-404.
1974 Activism and Powerful Others: Distinctions Within the Concept of Internal-External Control. *Journal of Personality Assessment* 38:377-383.
1975 Multidimensional Locus of Control in Prison Inmates. *Journal of Consulting and Clinical Psychology* 5:342-347.
- Logan, Michael H.
1991 Locus of Illness Control Beliefs among Brazilian Herbalists: Findings and Methodological Recommendations. *Human Organization* 50(1):82-88.
- Madsen, William
1973 The Mexican-Americans of South Texas, 2nd Edition, New York: Holt, Reinhart and Winston.
- Martin, Philip
1992 Farm Labor in California: Past, Present, and Future. A Supplemental Report for the Farm Worker Services Coordinating Council. Davis: University of California.
- Mirowsky, John and Catherine E. Ross
1984 Mexican Culture and its Emotional contradictions. *Journal of Health and Social Behavior* 25:2-13.
- Mulaik, Stanley A.
1972 The Foundations of Factor Analysis, New York: McGraw Hill Book Company.
- Palerm, Juan V.
1991 Farm Labor Needs and Farm Workers in California. 1970 to 1989. California Agricultural Studies 91-2. Employment Development Department.
- Pilisuk, Marc and Curt Acredolo
1987 Fear of technological hazards: One concern or many? *Social Behavior* 3:17-24
- Price, James H., Sharon M. Desmond, Mark Wallace, Daisy Smith, and Paul M. Stewart
1988 Differences in Black and White adolescents' perceptions about cancer. *Journal of School Health* 58(2):66-70
- Rothbaum, Fred, John R. Weisz, and Samuel S. Snyder
1982 Changing the World and Changing the Self: A Two-Process Model of Perceived Control. *Journal of Personality and Social Psychology* 42(1):5-37
- Rotter, Julian B.
1966 Generalized Expectancies for Internal Versus External Control of Reinforcement. *Psychological Monographs: General and Applied* 80(1):1-28
- Rouech, John E., and Oscar G. Mink
1976 Impact of Instruction and Counseling on High Risk Youth. Final Report, NIMH, Dept. of Educational Administration, Austin: University of Texas.
- Russell, Stephen F. and Krista Ludenia
1983 The Psychometric Properties of the Multidimensional Health Locus of Control Scales in an Alcoholic Population. *Journal of Clinical Psychology* 39:453-459.
- Sceman, Melvin and John W. Evans
1962 Alienation and learning in a hospital setting. *American Sociological Review* 27:772-783.
- United States Department of Commerce. Bureau of Census of Agriculture.
1987 Geographic Area Studies, Part 5, Vol. 1. California State and County Data. Library of Congress, Superintendent of Documents, Washington, DC: United States Printing Office.
- United States Department of Health and Human Services
1992 Setting the National Agenda for Injury Control in the 1990s. Papers from the 3rd National Injury Control Conference. Atlanta: Centers for Disease Control.
- Vaughn Elaine and Brenda Nordenstam
1991 The Perception of Environmental Risks Among Ethnically Diverse Groups. *Journal of Cross-Cultural Psychology* 22(1):29-60
- Wallston, Kenneth A., Barbara S. Wallston, Gordon D. Kaplan, and Shirley A. Maides
1976 Development and Validation of the Health Locus of Control (HLC) Scale. *Journal of Consulting and Clinical Psychology* 44:580-585.
- Wallston, Kenneth A. and Barbara S. Wallston
1978 Development of the Multidimensional Health Locus of Control (MHLC) Scales. *Health Education Monographs* 6(2):160-170.
- Weinstein, Neil D.
1985 Reactions to Lifestyle Warnings: Coffee and Cancer. *Health Education Quarterly* 12:129-134
1989 Effects of Personal Experience on Self-protective Behavior. *Psychological Bulletin* 105(1):31-50
- Wildavsky, Aaron
1988 Searching for Safety. New Brunswick: Social Philosophy and Policy Center and Transaction Publishers.