RISK PERCEPTION AND RESOURCE SECURITY FOR FEMALE AGRICULTURAL WORKERS

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ABSTRACT

This paper extends the behavioral ecology framework to predict how individuals perceive and evaluate risks. The perceptions of health and safety hazards for females, and how those perceptions relate to resource security and resource acquisition are examined. Poverty and inequality affect the constraints and opportunities available for Hispanic women working in apple packing warehouses in Eastern Washington. Warehouse workers see the health and safety risks inherent in their work and view the hazards from their positions of relative vulnerability with respect to resources. They are active agents who evaluate their situations and work to provide secure resources for themselves and their offspring within the local political and socioeconomic context.

"For women, [the apple warehouse] is the only place where we are able to find work. Very often the women do not speak English and cannot find jobs some place else. For the women, even if they treat you badly, you have to stay there because women need the work. They [women] know that there is no other source of money to keep the house going. And I think the woman [sic] has to lower her head [stay quiet] and be passive so she doesn't get fired. Because they don't want to lose their jobs. Even if someone is treated badly, they still need to work" (39-year-old woman with 4 children).

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Human behavioral ecology (HBE) is one approach for explaining variation in behavior from an evolutionary perspective. In particular, HBE examines how behavior is influenced by reproductive factors and the resources required to support them (Borgerhoff Mulder, 1991). Models of risk have been developed that show behavioral differences between males and females with respect to resource acquisition for themselves and their offspring (Chisholm, 1999; Hawkes, 1990). Tests of behavioral ecology theory have generally emphasized resource allocation and reproductive strategies among foraging populations, including gender-based differences in risk-taking strategies (Winterhalder & Smith, 2000). In this paper, I expand HBE in two ways: first, I model risk perception rather than risk behavior, and second, I apply the model in an industrial society context. Risk perception is concerned with how people evaluate risk and uncertainty (Cashdan, 1990). This study investigated the ways in which Hispanic women perceive health and safety hazards in the Washington fruit packing industry in relation to personal characteristics and household resources within the political economy of the region.

CONSTRAINTS AND OPPORTUNITIES IN THE LOCAL ECOLOGICAL CONTEXT

Demographics and Economics of Yakima Valley

Yakima County is the second largest county in area in Washington State. In 1999, one third of the population reported they were of Hispanic origin (United States Bureau of the Census, 2000). Nineteen percent of all Yakima residents were estimated to be below the federal poverty levels in 1999 (Peterson, 2000). The unemployment rate remains one of the worst in the state at just under 10% (Washington State Employment Security Department, 2000). Hispanic workers are particularly at risk of unemployment. In 1995, the unemployment rate for Hispanic adults was 24%. Agriculture is one of the main sources of employment in Yakima County. Agricultural employment is seasonal and labor intensive, with low pay, high turn over, and a high rate of work-related illnesses and injuries.

Industry Context

Washington State is the leading producer of apples in the nation, and the Yakima Valley is the largest apple producing region in the state (Washington Apple Commission, 2000). There are about 4000 growers and an estimated 41,000 people working in the statewide billion dollar a year apple industry (United States Bureau

of the Census, 1999). About 12–15,000 people work in the warehouses, sorting and packing fresh apples for shipping (Washington Agricultural Statistics Service, 1999). Due to international competition, apple growing and packing have suffered deep losses and many orchards have been pulled up and warehouses closed in the last several years (Guterson, 1999). In Eastern Washington, the majority of employees in packing houses are Hispanic (Jarosz & Qazi, 2000). A continued influx of migrants seeking work, and increased transnational competition in the apple industry, conspire to keep wages and job availability low (Qazi, 1998).

Description of Warehouses and Warehouse Work

In a typical apple-packing warehouse, the fruit is brought in from the field or cold storage in large bins (450–1100 pounds). The bins of fruit are dumped into the automated packing line where they are carried through washing vats containing detergents and disinfectants and sprayed with protective waxes (Peleg, 1985). Workers sort the fruit for damage, size and color. The conveyer line carries the apples through machines that sort them by quality for packing. Workers pack the fruit by filling trays or bags and placing them into boxes weighing 45 pounds. These boxes are then stacked onto pallets by other workers. The sorters and packers are typically women while men are generally stackers.

Hispanic Women and Work

Hispanic workers appear to be over-represented in hazardous job categories and therefore more likely to suffer occupational illness and injury than the rest of the United State population (Friedman-Jimenez & Ortiz, 1994). Research with Hispanic women working in the California canneries (Zavella, 1987) as well as *maquiladora* workers on the U.S./Mexican border (Peña, 1997) provides important insights into similarities and differences with apple warehouse work, including gender-based divisions of labor, seasonal vs. year round employment, and the implications of automation in the workplace.

Worker Conditions

Like other agricultural workers around the country, and around the world, apple packing house employees suffer many hardships (Krissman, 1999; Teamsters/United for Change, 1997). Low wages and no health insurance coverage

are the norm at most warehouses. The average annual wage in the apple warehouses is below the average annual wage in all five of the state's apple-growing counties (Mapes, 1998). Repetitive motion and musculo-skeletal disorders are common. Many workers complain of allergies and toxic reactions to the chlorine and waxes used on the apples, as well as the carbon monoxide from diesel forklifts operating in a closed environment (Jacklet, 1996). Workers fear the loss of their jobs, and complain about poor treatment from management (Stover, 2000). Injured workers have a hard time getting compensation claims paid. They also cite racist and age discrimination practices in the workplace (Harris, 1999). Moreover, the apple industry is increasingly segregated by a gendered division of labor whereby women are limited to packing and sorting jobs and excluded from higher paying work as forklift drivers, computer operators, or even orchard workers (Qazi, 1998). Finally, the Immigration and Naturalization Services (INS) have targeted apple-packing houses. In February 1999, hundreds of illegal workers at 13 Yakima area fruit warehouses were fired in the largest INS enforcement action ever taken in Eastern Washington (Verhovek, 1999).

THEORY

Human behavioral ecology incorporates life history theory that attempts to explain how the entire timing of the life cycle of an organism contributes to its fitness (Hill, 1993). Life histories are evolved traits but they can also be behaviorally modified. A central part of life history theory is the principle of allocation, which states that energy used for one purpose cannot be used for another. The theory therefore predicts that behaviors will result in life histories of energy distribution that lead to the highest fitness given genetic and environmental constraints (Stearns, 1992).

In this study, the focus is the tradeoff between reproduction and embodied capital (Kaplan, 1994). Embodied capital is the combination of physiological condition, knowledge, skills and social networks used by an individual over their lifetime. People may engage in behaviors that provide benefits to their embodied capital now at the expense of current reproduction, or conversely, avoid short-term costs in favor of long-term benefits. For example, delaying child-bearing while attending college increases embodied capital and provides opportunities for increased future income to support children. Individuals make choices throughout their life course based on their assessment of the costs and benefits of those choices within the constraints of the local context. These decisions have both short and long-term repercussions and are the basis for behaviors intended to maximize lifetime reproductive success.

Risk and Uncertainty

One component of behavioral ecology is "how people respond to unpredictable variation in environmental and economic conditions (risk) and lack of information (uncertainty) about those risks" (Cashdan, 1990). Chisholm (1999) argues that organisms are generally risk-averse. That is, they will prefer short-term known risk to a long-term risk even if the long-term risk has potentially greater benefits. Numerous researchers have developed and refined models examining risk averse and risk prone behavior with regard to subsistence and resource security (see for example Winterhalder et al., 1999).

In situations of high environmental risk and uncertainty, such as those generated by poverty and inequality in human society, the risk-averse characteristic is most apparent (Chisholm, 1999). People will tend to avoid long-term plans with risky, though possibly more beneficial outcomes, in favor of short-term security. For example, in an area with high unemployment, a woman with limited education and language skills might work in a job with potentially harmful health hazards but a weekly paycheck, in lieu of taking English language classes at the local community college. In doing so, she gives up the possibility of greater future earning potential in favor of short-term financial safety, and risks long-term adverse health effects.

Numerous studies using HBE models on risk-taking behavior have looked at short-fall minimization strategies in hunter-gatherer, pastoralist, forager/horticulturalist and agricultural populations (Smith & Winterhalder, 1992). In general this work has been limited to tribal and peasant economies which, Cashdan argues, lack formal institutions that buffer against unpredictable resource fluctuations (Cashdan, 1990). The reasoning is that industrial societies have welfare, food stamps, and even emergency health care programs that prevent people from experiencing starvation and mortality.

I argue that many Latina women in Eastern Washington lack institutional buffers despite living in industrial Western society. For example, immigration issues, barriers to health care and health insurance, as well as the elimination of welfare-to-work programs and high unemployment rates, create an environment of uncertainty about steady resource acquisition or, unpredictable variation in economic conditions.

Male and Female Differences

While the current study is limited to examining risk perception in adult women, behavioral ecology helps explain why male and female risk-*taking* strategies are expected to be different. One component of these strategies is behavior for resource

acquisition. Male and female strategies will differ because of the varying constraints on male and female reproduction patterns, including parental investment in offspring. Due to sexual selection, males tend to invest in mating, or, maximizing the quantity of offspring, while females tend to invest in gestation and care, or, maximizing the quality of offspring (Trivers, 1972). Females have less variance in the average number of offspring than males, where some males may have very low reproductive success while others may have a large number of offspring. Thus, Chisholm argues that females will be more risk-averse, and more willing to forgo short-term gains for longer term rewards (Chisholm, 1999). Similarly, males will follow strategies that increase their access to mating opportunities, while females will pursue strategies that provide resources for reproducing and maintaining their offspring (Borgerhoff Mulder, 1992; Kaplan & Lancaster, 2002).

Behaviors to enhance these goals will vary over the life course and will be dependent on reproductive status. For example, Hawkes argues that Aché males are more inclined to hunt for meat rather than gather plant-based food with higher average caloric returns, as Aché females do. She suggests that hunters may have more mating opportunities if they are able to bring in occasional bonanzas that feed others in their group (Hawkes, 1990). Females ensure a steady, if potentially smaller, supply of food for themselves and their offspring, corresponding to their strategies for reproductive success. The female strategy can be modeled as a normal curve rarely yielding high daily incomes. The male strategy has frequent low returns, but occasional high caloric payoffs. This male strategy maximizes the chances of capturing a very large income, whereas females assure themselves of steady access to resources to support themselves and their offspring. In other words, females benefit by pursuing resource acquisition strategies that have higher mean daily intake and narrower variation around the mean.

In the occupational health arena of industrial societies, reproductive performance to date may affect women's decisions about risk-taking at work. Women with small children who require intense care may forego potentially hazardous work environments (unpredictable variation in environmental conditions) at the cost of lower pay, in order to take care of their children. Alternatively, they may be willing to work in environments with serious long-term risks because of the higher short-term benefit to their offspring of a steady paycheck.

Risk Perceptions vs. Risk-Taking Behavior

To date, most behavioral ecologists have focused on behavioral responses, or actual responses to risk and uncertainty (Cashdan, 1990). I believe that how people

perceive work-related risks – how they actually evaluate risks and uncertainty – is as interesting as their behavior around risks. Several approaches have informed this work.

First, Chisholm contends that adults view the world through their own developed representations of risk and uncertainty in order to reduce actual risk and uncertainty (Chisholm, 1999). Again, the ultimate goal is fitness. His biological explanation is that the genes that code for behavioral plasticity shape these views, and that this plasticity is based on both the evolutionary environment and the lifetime-accumulated experience of the individual. In other words, perceptions of risk are shaped by actual experience of risk and knowledge about risks both within the lifetime and over evolutionary time.

Second, some sociocultural anthropologists have explored risk perception, especially Mary Douglas (Douglas & Wildavsky, 1983). According to the "cultural theory of risk," risk is a combination of knowledge about the future and cultural consensus about the most desired prospects for the future. Perception of risk is viewed as a social process and cultural constructs of risk do not necessarily follow scientific traditions of causality (Douglas, 1985).

Slovic and other psychological researchers have developed another approach to measuring perceptions of risk called the "psychometric paradigm" (Flynn et al., 1994). "The psychometric paradigm encompasses a theoretical framework that assumes risk is subjectively defined by individuals who may be influenced by a wide array of psychological, social, institutional and cultural factors" (Slovic, 2000). This approach uses "psychometric scales" that reflect characteristics of the risks, such as knowledge of the risks, severity of the consequences and controllability of the potential impacts.

Following these perspectives, Hispanic female workers will perceive occupational risks through filters of ethnicity and gender, personal experience and community context. A behavioral ecology framework allows the additional consideration of more proximate factors such as individual variation in reproductive factors and resource requirements. The attributes that define an individual, including individual reproductive and embodied capital characteristics and household resources produce a net account of resource availability and needs for the individual and her offspring. This net need for resources then shapes the individual's perceptions of workplace health and safety hazards.

Variations in risk perceptions will be different for males and females, just as risk behaviors are different. Female risk perceptions may produce strategies that secure relative short-term stability in resources to support themselves and their offspring. The way that risk perceptions are regulated by individual characteristics and resource needs can be modeled. I predict that there is a negative

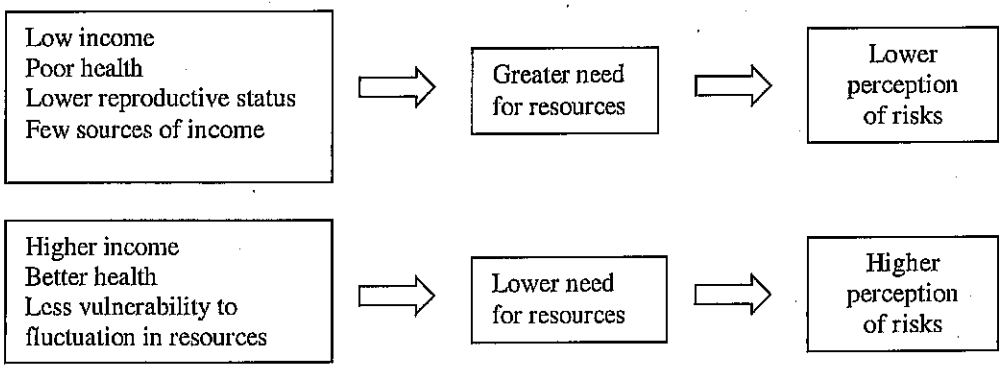

Fig. 1. Causal Order of Risk Perception Model.

relationship between resource needs and risk perception. Individuals will have lower perceptions of risk in order to tolerate hazardous conditions so that they can achieve their goals of gaining resources, and ultimately, improving their reproductive success. Figure 1 shows the causal direction of this model.

The hypothesis tested in this study is therefore that women will perceive risks as lower when: (1) the current need for resources is high; (2) the future need for resources is expected to be high; (3) the current availability of resources is low; and (4) future access to resources is expected to be low.

METHODS

Interviews were conducted with 69 Latina apple warehouse workers in the Yakima Valley and Columbia Basin of Washington State between February and August 1999 (see Snyder, 2001 for more details). Study participants were recruited through another study (Simcox et al., 2001) and personal contacts. While participant selection was not random, the final distribution reflected a range of ages, experience, length of time in the area, and injury experience (see Table 1). All the interviews took place outside the workplace, usually in the participant's home. The interview covered many topics, derived from previous research with agricultural workers (Arcury, 1995; Perry & Bloom, 1998; Vaughan, 1993) as well as interviews with Yakima-area key informants. Topics included: personal work conditions in the current and previous job, work experience, perceived voluntariness of warehouse work, actual experience of occupational illness and injury, perceived health and safety risks, beliefs about personal likelihood of injury, actions to prevent occupational illness or injury, and control over risks as well as demographics characteristics, health status, household characteristics, and household economics.

Table 1. Individual Reproductive Status and Embodied Capital Characteristics ($N = 69$).

Variable	Mean (S.D.) or %	Notes
Age in years	38.5 (11.1)	9 participants above age 50
Number of children	3.7 (2.7)	5 participants had no children
% Married or living with a partner	71%	15% reported they were single, and 14% divorced, separated or widowed
Years of education	6.5 (4.2)	8 had no school and 14 had graduated from high school or higher
Years living in the area	15.6 (7.8)	Only 13% had lived in the area 5 or fewer years
Years working in agriculture	14.3 (7.7)	Very high correlation with years living in the area ($r = 0.89, p < 0.001$)
% Reporting a work-related injury from apple warehouse work	54%	No way to estimate how this compares to the population of female warehouse workers
Self-reported health status	Excellent, very good, or good: 46%, Fair or poor: 54%	69% of injured workers reported fair or poor health, compared to 38% of workers not reporting work-related injuries
% With no English language skills	37%	These women were older, had less education, more children, and less time in the community
% Currently taking a class	31%	Generally English language or literacy
% Reporting regular church attendance	62%	Sometimes: 19%, Never: 14%, Most participants were Catholic

Outcome Variable: Risk Perception

A central part of the study was to establish useful measures of risk perception. This paper reports on one scale that was created from four questions. I used Likert-scaled questions about perceptions of risk from previous research with Hispanic agricultural workers (Vaughan, 1993), modified for the apple warehouse industry. This scale consisted of four questions:

(A) In general, please rate the extent to which you think that apple packing house work poses a risk to human health? (no risk, little risk, same as any other job, some risk, a great deal of risk).
(B) How often, in the past month, have you had thoughts or fears that your work is affecting your health? (never, rarely, sometimes, frequently, constantly).
(C) In general, how likely do you think it is that you will experience an illness or injury that is related to your work? (not likely, slightly likely, somewhat likely, very likely, completely likely).

(D) How likely do you think it is that you personally will experience health problems in the future that are due to previous work in the packing houses? (no chance, slight chance, possible, very likely, definitely likely).

Both factor and reliability analysis indicated that combining the four questions into a single variable was reasonable (Dunteman, 1989). The scale has a high Cronbach's alpha reliability coefficient (0.73), and was found to correlate favorably with quantitative and qualitative responses to other questions. The values of this scale range from one to five, so a low score indicates low perception of risks and a high score indicates high perception of risks. The distribution of the scale variable is normal.

Analysis

Independent variables representing reproductive status, embodied capital and household resources were compiled from the interviews and evaluated with univariate methods to determine variation in the population. Multiple linear regression and analysis of variance methods were used to determine how much of the individual variation in risk perception could be accounted for by variation in the independent variables (Kleinbaum et al., 1988). Regression models included individual characteristics, embodied capital factors, and household resources as independent variables, and the risk perception scale as the outcome measure. Interaction effects were included in the regressions, and further analysis was conducted on those with statistically significant effects (Jaccard et al., 1990).

RESULTS

Individual Characteristics of Participants

All of the participants were Hispanic women. Three were born in the United States, one in El Salvador, and the rest were born in Mexico. Table 1 shows selected reproductive status and embodied capital characteristics of the 69 study participants. The mean age of the participants was 38.5 years, and the mean number of children ever born to the participants was 3.7 (range 0–13). Most of the participants were married or living with a partner. The mean years of education were 6.5, or completion of *primaria* (elementary school) in Mexico. Most of the participants had lived and worked in the Yakima Valley and Columbia Basin for about 15 years. Fifty-four percent of the participants reported a work-related

injury from apple warehouse work. This is a very high proportion of workers, and cannot be assumed representative of injuries and illness for all warehouse workers in Washington State. Similarly, 37 participants (54%) reported fair or poor health status on a standardized instrument (Stewart, 1996). About one third of the participants had no English language skills, and in general, these women were older, had more children, and had spent less time in the community than other participants had. Thirty-one percent of the participants were currently taking an English language or literacy classes, and nearly two-thirds of the participants reported regular church attendance (at least once a week).

Household Characteristics

Table 2 shows some household characteristics. The mean number of children living in the household was 2.2. There were eight participants who had no children in the home, and ten participants had grandchildren living in their home. There were 4.8 people on average living in the participants' households and an average of two workers within each household. The average annual self-reported

Table 2. Household Characteristics ($N = 69$).

Variable	Mean (S.D.) or %	Notes
Number of children living in the household	2.2 (1.4)	8 participants had no children living in the home 10 participants had grandchildren living in their household
Number of people living in the household	4.8 (2.1)	Household members supported by or contributing to household income. Temporary visitors excluded
Number of workers in the household	2.0 (1.0)	Full-time workers only
Annual household income	$26,980 ($13,900)	Median is $22,500. Yakima County median is $34,900
Per capita income	$6,652 ($5,308)	Median is $5,600. Yakima County median is $15,000
Household Head Status	HH Head alone: 25%, HH Head with Partner: 62%, Other: 15%	Female-headed households had fewer workers and lower income
% Of households owning their homes	48%	Additional 7 participants lived in homes owned by family members
% Of households with a savings account	52%	Amount in account not asked

household income was $26,890 (SD $13,900, range $8,200–$70,000). This does not include WIC, medical coupons, unemployment, or other governmental support. The income is positively skewed, as the median income is only $22,500. Apple warehouse workers and their households average below the median income for Yakima County – $34,900 (United States Bureau of the Census, 2000). The discrepancy between the per capita income of apple warehouse workers and the county median is even greater: $5,600 vs. $15,000. About one quarter of the participants were sole heads of household, and female-headed households generally had fewer workers and lower income than households where both the participant and her spouse or partner were household heads. Nearly half of the participants owned their own homes and about half the participants stated that they had a savings account, though the amount of money in the account is unknown.

Regression Analysis

The analysis involved building a model that explains variation in the risk perception variable as influenced by reproductive success, embodied capital, and household resources. The final model was constructed by including the seven variables that contributed significant explanations of variation in risk perception. Table 3 shows these variables and the direction the variable is predicted to influence risk perception. The outcome variable is the Risk Perception Scales. The mean response on this scale was 3.17 (SD: 0.92) with a range from 1 (no risk) to 5 (a great deal of risk).

Lower household income was predicted to be associated with lower perceptions of risk, as individuals need to work in this job and would be risk averse – more concerned about the short-term factors of providing for themselves and their family rather than the long-term consequences to their health and safety. The influence of children on risk perception depends on the age and number of children, but also on the financial and non-financial resources required to support them (Panter-Brick, 1989; Tierney et al., 1990). The number and age of children in the household, not necessarily the offspring of the participant, is the variable used in this analysis. Some of the participants were living with their grandchildren, while other participants were the siblings of other children in the household. Sixteen percent of the participants' households only had children under age 5, and 15% only had children 13–18 years old. Children under five are not in school, so childcare needs to be arranged. Teenagers do not require as much direct assistance, though they certainly require plenty of attention. The mean value for perception of risk for participants with children under five in the household is 2.50 while the mean value for participants with older children in the home is 3.50. Worse self-reported

Table 3. Descriptive Statistics and Effect on Risk Perception.

Variable	Type	Values	Direction of Effect on Risk Perception	Significance
Risk perception scale	Scale (1 – no risk to 5-great deal of risk)	Mean: 3.17 SD: 0.92		
Annual income	Continuous (range \$8,200 – \$70,000)	Median: \$22,500	Higher income participants had LOWER perceptions of risk	$p = 0.022$
All children in household under age 5	0/1	No, $N = 58$ Yes, $N = 11$	Participants with younger children in household had LOWER perceptions of risk	NS
All children in household 13 years or older	0/1	No, $N = 57$ Yes, $N = 10$	Participants with older children in household had HIGHER perceptions of risk	$p = 0.046$
Self-reported Health status	0/1	Excellent, Very good, or good, $N = 31$ Fair or poor, $N = 37$	Participants with fair or poor health had HIGHER perceptions of risk	$p = 0.011$
Savings account	0/1	No, $N = 33$ Yes, $N = 35$	Participants with a savings account will have HIGHER perceptions of risk	NS
Currently taking a class	0/1	No, $N = 46$ Yes, $N = 21$	Participants taking a class will have HIGHER perceptions of risk	NS
Attend church	0/1	No, $N = 10$ Sometimes or regularly, $N = 55$	Participants who attend church have HIGHER perceptions of risk	$p = 0.008$

health status was predicted to be associated with lower perceptions of workplace risk since the current need for resources to improve health is high for women whose self-reported health status is poor. Having an open savings account was predicted to lead to higher perceptions of risk since it indicates more resource security, though no association was found in bivariate analysis. Currently taking a class was predicted to increase risk perception, since it increases the possibility of finding a better (safer, higher income) job. However, no association was found. The relationship between church attendance and risk perception is discussed below, but was predicted to lead to higher perceptions of risk.

Table 4 shows the results of a multi-linear regression analysis for the influence of individual and household characteristics on perceptions of workplace health and safety risks. Six cases were excluded from the final model due to missing

Table 4. Regression Analysis.

Predictor Variables	Standardized Coefficients Beta	Significance
Annual household income	−0.219	0.058
Fair or poor health status	0.316	0.008
Taking a class	0.288	0.013
Children under 5 years	0.114	0.451
Children 13 years and older	−0.777	0.018
Savings account	0.115	0.355
Attend church	−0.198	0.109
SAVINGS × CHILDREN UNDER 5	−0.457	0.005
CHURCH × CHILDREN 13 AND OLDER	0.926	0.005

R-square $= 0.42$, $N = 63$, df $= 9$, $F = 4.22$, $p < 0.001$.

values, leaving a sample of 63 women. Altogether, the seven predictors plus two interaction terms account for 42% of the variance in this dependent variable.

Of the seven variables, only taking a class influenced risk perception in the expected direction. Fair or poor health status and taking a class have similar beta values and, therefore, similar predictive impact on this measure of perceived risk. Perception of risk is higher for participants with self-reported fair or poor health status and for participants who were currently taking a class. However, worse self-reported health status was expected to result in lower perceptions of risk. In addition, perception of risk was lower for participants with higher incomes contrary to expectations. It was also lower for participants with both children under five and a savings account. Risk perception is higher for participants who both attend church and have children 13 years and older in the home. Although household income is not significance ($p = 0.058$), it is close enough to warrant inclusion in this model. The two interaction terms, SAVINGS × CHILDREN UNDER 5 and ATTEND CHURCH × CHILDREN 13 AND OLDER, will be explained further in the discussion.

DISCUSSION

Most of the reproductive status, embodied capital and household resource variables did not show significant statistical association with the risk perception scale. However, they provide important information into the diversity of what might seem to be a relatively homogenous population – Hispanic female apple warehouse workers in Yakima County, Washington. Per capita income provides one example of this: the discrepancy between median per capita income of apple warehouse workers and the Yakima county population ($5600 vs. $15,000)

indicates that the study participants live in homes with more household members than the average Yakima household (United States Bureau of the Census, 2000). It also demonstrates why access to resources and need for resources is a much more complex issue than simply the dollar amount of household earnings.

Individual and household factors clearly influence perceptions of workplace health and safety risks for Latina warehouse workers in Eastern Washington. Some of the results in the final model agreed with the *a priori* hypotheses, and others did not. An alternative explanation is that apple warehouse workers do not appear to modulate their risk perceptions in ways that make them more tolerant of the situation. Rather, they view the hazards from their positions of relative vulnerability with respect to resources.

Risk perception was predicted to be lower for participants with lower household income because their current access to resources is low. However, in the analyses, the opposite correlation appeared to hold – lower income was associated with greater perceptions of risk. Household income may be inversely correlated with risk perception because women are not deceiving themselves about the risks in order to cope with their work situation. It may be that individuals assess their workplaces with respect to their own life history and resource parameters.

Having fair or poor health status predicted higher levels of risk perception, which disagrees with the hypothesis that risk perception will be lower when current need for resources is high, and future access to resources may be low. This might be operationalized through increased medical expenses, as well as an inability to work in the future due to ill health. Again, it seems that apple warehouse workers do not fool themselves about their risks. One explanation may be that people in who perceive themselves in poor health are more vulnerable to situations that place steady resources in jeopardy. Schrijvers points out that fair or poor health "in the working population could be attributed to a differential distribution of hazardous physical working conditions and low job control across occupational classes" (Schrijvers et al., 1998). This is particularly true when we see that poor health and lower incomes are linked. Therefore, Latina apple warehouse workers in poor health may view their work situation, and perhaps their overall environment, as being riskier than those in better health do.

Participants who were currently taking a class at the time of the interview were likely to have higher perceptions of risk than participants who were not taking classes. This agrees with the hypothesis that not taking a class should predict a lower perception of risk due to lower access to resources in the future. Taking a class (in most cases English language or Spanish or English literacy) may act to increase perception of risk in two ways. First, workers with bilingual language skills have more opportunities for higher paying and less risky jobs, both within and outside the apple warehouses. Taking a class improves both one's prospects for future work

and may raise one's perceptions of the dangers of the current position. Second, higher levels of education are often associated with greater knowledge in general. Simply taking classes may provide participants with more information about the safety and health hazards in the workplace, thus increasing their perception of workplace risks.

There are two statistically significant interaction terms – between possessing a savings account and having children under five years old in the home, and between church attendance and having a teenaged child in the home. I predicted that having young children in the household, even if the participant was not the mother, would lower risk perception due to the increased need for resources both currently and in the future as they grow up. Increased resources include both the financial costs of raising children and the psychosocial and energetic costs of investing in the embodied capital of offspring. Similarly, I predicted that risk perception would be lower for participants without savings accounts as their future access to resources would be lower without the buffer of a savings account.

The interaction term of SAVINGS ACCOUNT × CHILDREN UNDER FIVE is statistically significant ($p = 0.005$) and negative (beta $= -0.46$). This interaction term shows that the risk perception of women with savings accounts is lower when they have children under age 5 in the household. A two-by-two table is one way of looking at interactions, and can be helpful for teasing out the meaning of the interaction. Table 5 shows that participants with savings accounts and children under five have much lower mean perceptions of risk than all other participants do (2.45 vs. 3.23). These participants need to work, but they have a buffer. Their current needs are high and their future needs are high, but the buffer of an existing

Table 5. Mean Risk Perception and Number of Cases (*N*) For Savings Account and Young Children and Church Attendance and Older Children.

	No	Yes	Total
Savings account			
All children in household under age 5			
No	3.22 (26)	3.23 (30)	3.22 (50)
Yes	3.29 (6)	2.45 (5)	2.9 (11)
Total	3.23 (32)	3.11 (35)	
Attend church			
All children in household 13 years or older			
No	3.44 (9)	3.06 (46)	3.13 (55)
Yes	1.75 (1)	3.75 (9)	3.55 (10)
Total	3.28 (10)	3.18 (55)	

savings account, no matter the amount of money in the account, lowers the perception of risk even further. Unfortunately, there is no data on the amount of money in the savings account. However, the fact of simply having a savings account may indicate a level of stability and residency in the local community, which might indicate more confidence about resource security. The interaction decreases the risk perception – a need for resources is high so the risk perception is low, but the combination of high need and low perception of risk may lead to saving money.

The interaction term between church attendance and whether the household only has children 13–18 years old also warrants discussion. This interaction yields a standardized beta coefficient of 0.93, with a p-value of 0.005. The interaction term means that the risk perception of people who attend church will go up by nearly one unit if the children in the household are all 13 years or older. This is nearly a 25% increase in the scale of one to five (see Table 5).

The first thing that stands out in this table is the single case of a participant who does not attend church and has one child who is between 13 and 18 years old. She reported a very low perception of risk compared to most of the rest of the participants. However, the interaction term is driven by the nine participants who attend church and have older children in their home (mean risk perception = 3.75). These participants may have a higher perception of risk because their children are older and their future need for resources may be lower as the children leave the home. Their access to resources also may be higher as the children begin to earn income that contributes to household resources. In fact, many of the women in the study lived in households where youth worked part time and contributed to the household income (data not shown). Although overall church attendance has a significant association with higher risk perception, the effect with older children is to increase the perception of risk even more.

Church attendance might correlate with risk perception in several ways. First, church attendance might represent and nurture social ties and social support within the community. It might represent a network of people who can help provide resources as needed, including advice on job opportunities, childcare, and medical services. As such, the community support of church attendance might increase perceptions of work place risk, giving apple warehouse workers ideas about alternatives. It is also possible that church attendance is associated with a more "fatalistic" outlook on life, which might lower perceptions of risk. Grieshop cautions however, that people can simultaneously hold several belief systems about luck, God, and their personal role in reducing workplace injuries (Grieshop et al., 1996).

On the other hand, risk perception may actually influence church attendance. Apple warehouse workers who perceive themselves as working in a dangerous and unsafe environment may turn to the church for solace and spiritual comfort to help them cope with the stresses of the workplace. Alternatively, they might

hear stories of problems that others have experienced. In either case, higher risk perception will be associated with church attendance.

Limitations

This analysis is based on relatively small sample of 69 women. Statistical tests confirmed that the sample size was adequate for the bivariate and multivariate analyses that were conducted. Nonetheless, the sample of women was not a randomly selected sample, and therefore, the results cannot be assumed representative of all female Hispanic apple warehouse workers. The sample included women with a wide range of ages, experience, and life history parameters. Moreover, there was high variance in the risk perception scale for women experiencing similar working environments. Therefore, I believe that the results from this study are indicative of patterns of attitudes, experiences, and beliefs of Hispanic female apple warehouse workers and can be used with some confidence. As one of the few studies to test behavioral ecology theory in an industrial population, the findings can be considered a useful step in testing this theoretical framework.

Are women evaluating their resources with a short-term view to getting food on the table this week, or are they considering their needs and availability of resources over the long term? The time frame of women's perceptions of risk is not clear from the data collected. One answer to this problem lies in the interpretation of the findings. It appears that apple warehouse workers are not deceiving themselves about the health and safety risks of work in order to cope with their needs. Instead, they are recognizing barriers and opportunities and trying to reduce the unpredictability of their environment with regard to resources. Since the variables involved all captured current resources issues – e.g. current age of children, current self-reported health status, and current annual income – I posit that the findings address a middle time frame. Perhaps the vulnerability is not about getting food on the table this week, as currently working was significantly associated with lower perceptions of risk (data not shown). Instead, it is with access and use of resources over the next year, since having a savings account may indicate some planning and expectations on an annual basis. This would be consistent with Chisholm's arguments about human tendencies towards risk-averse behavior (Chisholm, 1999).

Finally, the study was designed as a limited choice situation – apple warehouse workers perceptions of workplace risks for warehouses were examined but not compared to other jobs. The reality for many workers is that there is an alternative – they can do seasonal work in the apple orchards, asparagus fields, and cherry orchards in the area. However, they cannot opt out of warehouse work or

fieldwork, because of the job market that discriminates against them and limits their opportunities.

CONCLUSION

This paper demonstrates that there is variation in perceptions of workplace health and safety risks among female apple warehouse workers and that this variation can be explained, at least in part, by the unique situation of each individual as she conducts her life. It shows that this variation exists with a relatively homogenous group, and that individual perceptions of risk are modulated by their relative vulnerability with respect to resources.

Apple warehouse workers see the potential health and safety hazards inherent in their work. Moreover, their perceptions of these risks vary depending on their individual reproductive status, embodied capital and household resource needs. For example, lower household income and poor health are factors that may increase vulnerability to loss of resources and are both associated with higher perceptions of risk. The needs of offspring, as reflected in the age distribution of children, also affect perceptions of risk. Younger children require intensive childcare, while teenagers are able to contribute to household tasks. It is particularly interesting that the combination of having children under age five in the household as well as a savings account lowered mean risk perception, while having children age 13 and older and attending church increased risk perception. Hispanic female apple warehouse workers do not mask their workplace risks in order to cope with their resource needs, as I predicted in my hypotheses. Rather, it appears that people are capable of seeing the inherent risks in their work, but take the risks anyway. This research shows that these women are not passively reacting to their situation. They are active agents who evaluate their situations and work to provide secure resources for themselves and their offspring within the local political socioeconomic context.

In addition, I have extended behavioral ecology theory from predicting risk-taking behaviors around resources to predicting how individuals actually perceive and evaluate risks. In this study, women's risk perceptions were examined using a human behavioral ecology model of gender-based differences in risk-taking strategies with respect to resource acquisition to generate the hypotheses. Women's need for resources is the sum of individual and household factors such as her health status and the number of workers and dependents in the household. Based on this framework, women are expected to seek stable sources of income to provide for themselves and their offspring. This, in turn, affects their perceptions of workplace health and safety risks. The actual manifestation of risk and uncertainty may be different for women in societies with elaborate institutional frameworks than for

women whose productive and reproductive work is more directly translated into the health and well-being of their children. This paper shows that poverty and inequality affect the constraints and opportunities available for Hispanic women who work in apple warehouses to provide secure resources for themselves and their children. The perceptions of health and safety hazards reflect these factors.

There are numerous paths for extending and developing a human behavioral ecology framework for risk perception. One possibility would be to conduct a study in a situation with greater unpredictable variation in environmental and economic conditions such as subsistence level farming. It would be valuable to conduct the study with a similar population but a larger and randomly selected sample size in order to determine if more proximate reproductive status factors such as age and number of offspring can be shown to influence risk perception. Comparing male and female responses, as well as looking at situations where workers have more choices and opportunities in their workplace would also be helpful. Finally, the time frame for behavioral ecology definitions of risk-averse and risk-prone behavior needs to be better understood.

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