PARENTS' SAFETY BELIEFS, CHILDREN'S WORK PRACTICES AND CHILDHOOD AGRICULTURAL INJURY

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ABSTRACT

Family-run agricultural operations are exempt from most federal labor and safety standards, leaving parents solely responsible for monitoring children's exposures to agricultural hazards and keeping them safe. Despite the parents' pivotal role, research on parental determinants of childhood agricultural injury is lacking. This study evaluated whether children's agricultural work practices increased the risk of childhood agricultural injury, parents' safety beliefs reduced the risk of agricultural injury and were associated with chore assignments, and whether child and parent covariates predicted injury, work practices, or safety beliefs.

Analyses were based on nested case-control data, collected by the Regional Rural Injury Study-II (RRIS-II) surveillance effort in 1999 and 2001, using computer-assisted telephone interviews. Cases (n = 425) and controls (n = 1886) were persons younger than 20 years of age from Midwestern agricultural households. All injury events were selected as cases; controls were selected using incidence density sampling.

Using multivariate logistic regression, increased risks of injury were observed for children who: performed any agricultural work (odds ratio [OR] = 3.9, 95% confidence interval [CI] = 2.6-5.6); performed 7-10 chores per month compared to one chore (2.2, 1.3-3.5); worked 11-30 or 31-40 hours per week compared to 1-10 hours (1.6, 1.2-2.1

and 2.2, 1.3-3.7, respectively); and, performed chores an average of two-three years younger than recommended compared to performing “age-appropriate” chores (2.6, 1.4-4.5). Decreased risks of injury were observed for: non-working children compared to children performing minimal/safe levels of agricultural work; “moderate” versus “very strict” parental monitoring (0.70, 0.50-0.97); children of parents whose beliefs about the importance of physical readiness were more conservative (0.90, 0.70-0.99); and for females (0.50, 0.40-0.8) and working aged children (7-16 years of age, 0.70, 0.50-0.90) of parents whose beliefs about the importance of cognitive readiness were more conservative. Parents’ safety beliefs were not associated with chore assignments.

This study is the first to use population-based case-control data to evaluate the risk of childhood agricultural injury associated with performing developmentally inappropriate chores and parental safety beliefs. Results suggest that the efficacy of age restrictions and parental safety beliefs for preventing the occurrence of childhood agricultural injuries warrants further evaluation.

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ORGANIZATION

Chapters I through III of this thesis include an introduction, a comprehensive literature review, and a description of the research design and methods used. Chapters IV and V report the major findings of the research and are prepared for publication in peer-reviewed journals; because of this format, their background and methods sections are somewhat redundant with the first three chapters. A final chapter summarizes the results of the research.

CHAPTER I

INTRODUCTION

Agricultural operations expose almost two million children to hazards as workers, visitors, or household residents (Myers and Hendricks, 2001). Agricultural exposures disproportionately affect young workers; they are injured more often in agriculture than in other industries and their injuries are more serious (Castillo et al., 1994; Dunn and Runyan, 1993). Compared to the private sector, young agricultural workers are three times more likely to be fatally injured (Hard et al., 2002). Only 8% of working youth are employed in agriculture, yet 40% of fatally injured workers younger than 18 years old die while doing agricultural work – a higher proportion than in any other industry (AAP, 2001; BLS, 2000; Perry, 2003).

The United States has two primary sets of regulations related to health and safety, the Fair Labor Standards Act (FLSA) was enacted in 1938 to protect youths' educational opportunities and health and safety, and the Occupational Safety and Health Act (OSHA) was enacted in 1970 to protect the safety of workers of all ages. Despite the hazardousness of the industry, agricultural operations are mostly exempt from both FLSA and OSHA standards. Children working on their family operation are able to perform any task at any age; children working on other people's operations are permitted to perform hazardous tasks at younger ages than allowed in any other industry sector (USDA-NASS, 2005; USDOL, 1990). These exemptions leave parent's responsible for children's exposure to agricultural hazards. To help assess when, and under what supervisory conditions, children 7-16 years of age are developmentally ready to perform

62 common agricultural tasks, the North America Guidelines for Children's Agricultural Tasks (NAGCAT) have been developed (Lee and Marlenga, 1999). These voluntary standards recommend that more complex and/or hazardous tasks be performed by children who are older or more developmentally mature (Lee and Marlenga, 1999) and their dissemination has been associated with reduced rates of childhood work-related agriculture injuries (Gadomski et al., 2006).

Agricultural injury research has primarily been descriptive in nature and based on small sample sizes or on large administrative databases lacking valid denominators (Reed and Claunch, 2000; Stallones and Gunderson, 1994). The causal mechanisms of childhood agricultural injury are infrequently specified or evaluated. Collecting information on the circumstances at the time of, or immediately preceding, an agricultural injury, is extremely difficult, as the injury could be related to performing work, recreational activities, by-standing to another's work, and/or playing. These activities often overlap, are difficult to disentangle retrospectively or find comparable controls for, and are not identifiable using secondary data.

Pertinent to the current effort, causal theories that incorporate parents' decisions about their children's agricultural work practices, parents' safety beliefs and behaviors, or determinants of these two factors, do not exist nor are these factors typically measured, even though youth working on family operations account for more than 70% of all youth work injuries on agricultural operations (Myers and Hendricks, 2001). Given the magnitude of exposure and the limited research, further evaluation of whether parents' decisions about children's work practices and parents' safety beliefs/behaviors influence the risk of childhood agricultural injury is clearly needed. This study is among the few analytical studies to evaluate these associations and is uniquely able to accomplish this using a comprehensive regional surveillance database. The study results will guide future efforts to measure parenting factors associated with childhood agricultural injury and provide a basis for intervention.

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CHAPTER II

LITERATURE REVIEW

Definition of Agricultural Injury

An "agricultural injury" is most commonly defined as a physiologic traumatic event that occurs in an agricultural environment and requires medical attention or results in time lost from activities. This can include harm caused by machinery, animals, pesticides, dusts, noises, and repetitive motion. Injuries incurred while transporting agricultural goods on public roads are typically excluded. Several studies have restricted the definition of "agricultural injury" to events incurred while performing a task related to agricultural production and excluded events related to recreational activities or incurred while by-standing. Many agricultural injury studies use a case-series design and do not provide population denominators. The studies that do calculate rates have used different populations as denominators; the most commonly used denominators are the total population in a geographical area, the total rural population, the population estimated to reside on agricultural operations, or the total hours of agricultural work performed (Stallones and Gunderson, 1994). Because types of data, sources of injury, rate denominators, and age ranges of children vary widely across studies, reported injury rates are not comparable.

Magnitude of Agricultural Injury

In the United States, more than 100 youths younger than 20 years of age die annually as a result of agricultural injuries (Adekoya and Pratt, 2001; Goldcamp et al., 2004; Rivara, 1997) and over 22,000 are injured each year (USDA-NASS, 2004). In 2004, the fatal and disabling injury rates per 100,000 agricultural workers were 29.2 and

5,000, 8.35 and 1.67 times greater, respectively, than the rates for all occupations combined (NSC, 2005-6). Between 1979-1981 and 1991-1993, fatal agricultural injuries among farming and/or ranching children younger than 20 years of age declined by 39% (Rivara, 1985, 1997), possibly due to increased use of roll-over protective structures (ROPS), improved emergency care in rural areas, and utilization of safety education (Adekoya and Pratt, 2001). National occupational fatality surveillance systems of all aged workers found no clear downward trend in agricultural production fatalities reported between 1990-1995, compared to the trend for the general worker population (Hard et al., 1999b). The 2003 fatal injury rate for agricultural workers aged 16 years or older was 20.9 deaths per 100,000 workers, 6.5 times higher than the rate of 3.2 per 100,000 workers averaged across all industries and only second behind the highest rate, 22.3 per 100,000 workers, reported for mining (NSC, 2004). Goldcamp et al. (2004), reported a United States average annual agricultural fatality rate of 9.3 per 100,000 youths under 20 years of age for the years 1995-2000. Castillo et al. (1999), reported an agricultural-work related fatality rate of 12.2 per 100,000 full-time equivalent (FTE) youth workers, aged 15-19 years old, which was comparable to the FTE rate reported for adult agricultural workers aged 20-54.

In 2003, 110,000 disabling injuries were reported for agricultural workers aged 16 years and older on agricultural operations with 11 or more employees, resulting in an annual injury rate of 3.3 per 100 FTE workers, the fourth highest rate across industries and 35% higher than the rate for all industries combined (NSC, 2004). Injury rates of 1.8 and 2.7 per 100 FTE workers aged 15-17 and 18-19 years old, respectively, were calculated for 1995-1997 using National Electronic Injury Surveillance System (NEISS) data (CDCP, 1998). A similar rate had been reported for emergency department-treated work-related agriculture injuries – 1.72 per 100 youths during 1991-93 (Rivara, 1997). Rivara noted that the 1991-1993 non-fatal injury rate was 10% higher than the rate that had been observed a decade earlier (1.55 per 100 youths in 1979-1983). He suggested that the rate increase, when also considering the increase in the proportion of in-hospital deaths (from 15% in 1979-1983 to 46% in 1991-1993) and the 39% decrease in fatalities over the same period, indicated that children who would have died from their injuries a decade earlier are now surviving – potentially due to improved emergency medical services in rural areas.

Myers and Hendricks (2001) reported 1998 injury rates for United States agricultural household youths under 20 years old as follows: 1.87 per 100 youths overall, 1.41 work-related agriculture injuries per 100 household youths, and 1.06 non-work-related agriculture injuries per 100 household youths. National survey data showed a significant decline in the rate of agricultural injuries to household males between 1998 and 2001 and a 29% decrease in the number of injuries to youth living on farms; seventy-four percent of the 22,648 injuries reported for youth living on, hired to work on, or visiting household operations in 2001 were incurred by the 1.1 million youth who lived on the operations (Hendricks et al., 2004). The annualized rates for 1990, 1999, and 2001 agricultural and non-agricultural activity-related injuries among Midwestern youth under 20 years old, who lived on agricultural operations, were 1.68, 7.5, and 7.2 agricultural activity-related injuries and 6.98, 8.2, and 8.0 non-agricultural activity injuries per 100 youths, respectively (Gerberich et al. 2004; 2001).

More than one-half of all residents of agricultural operations live in the Midwest, most commonly on family operations (U.S. Department of Commerce, 1994). The Midwestern and Southern regions accounted for 79% of the nation's fatal childhood agricultural injuries during the period 1982-1996; Minnesota and Wisconsin accounted for 11% of those fatalities (Adekoya and Pratt, 2001) and 50% of the non-fatal agricultural injuries (NASS, 1999). In Minnesota, agriculture had the highest fatality rate of any industry for 1992-1996 (21.3 per 100,000 workers) (BLS, 1998). A 1991 statewide survey found that 58% and 16% of male and female high school students, living in rural areas of Minnesota, performed agricultural work during the previous year (Parker et al., 1994).

Exposure to Agricultural Hazards

Agricultural operations are unique in that children are exposed to both residential and occupational hazards. Almost two million children younger than 20 years of age have the opportunity for exposure to these hazards as residents of agricultural operations or as workers or visitors (Myers and Hendricks, 2001). In 1998, more than 1.2 million children resided on United States agricultural operations, and an additional 666,500 youth worked, but did not live on farms and/or ranches and were directly exposed as part of their employment (Myers and Hendricks, 2001). Agriculture is second to retail as the most common employer of United States youth, accounting for 8% of workers aged 15-17 (BLS, 1999).

Common hazards that children encounter on agricultural operations include machinery, livestock, electric current, firearms, bodies of water, and grain storage facilities (Adekoya and Pratt, 2001). The agricultural jobs most commonly performed by youth are animal care (44%), crop management (25%), and tasks with tractor implements (19%) (Marlenga et al., 2001). A statewide survey of North Carolina agricultural workers, aged 14 to 17, found that 82% had ridden a tractor (85% without seatbelts and 81% without ROPS), 77% had worked with large animals, 73% had moved heavy goods, and 60% had ridden an all-terrain vehicle (Schulman et al., 1997).

Machinery (most commonly tractors and other machines such as combines, hay processing equipment, wagons, and fork lifts) was involved in 25%-58% of work-related agriculture deaths (Goldcamp et al., 2004; Hard et al., 2002; Rivara, 1997; Stueland et al., 1996) and nearly 50% of the deaths of children younger than 10 years of age (Rivara, 1985). Two national surveillance systems found tractors to be the leading source of fatal injury for workers less than 25 years old (18%-23%); overturns were the most frequent event in both surveillance systems (Hard et al., 1999a). In 1982-1996 National Center for Health Statistics (NCHS) Mortality Data, agricultural machinery (including tractors) were also reported as the leading source of fatal injuries incurred by youths less than 20 years old on agricultural locations; children less than five years old accounted for almost 30% of the agricultural-machinery deaths (Adekoya and Pratt, 2001).

Other common sources of agricultural fatalities, for all ages, included animals, trees, automobiles, the ground, water, and bullets (Hard et al., 1999b; Hard et al., 2002). Common sources of agricultural fatalities in childhood included drowning and firearms (27% and 11%, respectively, Adekoya and Pratt, 2001; 24% and 15%, respectively, Rivara, 1997). Other researchers reported that drowning accounted for 9% (Hard et al., 1999a) and 16% (Goldcamp et al., 2004) of childhood agricultural fatalities; children younger than five years old accounted for 32% of the drowning deaths (Adekoya and

Pratt, 2001). Goldcamp et al. (2004), found that suicide and homicide accounted for 8% and 6%, respectively, of the United States agricultural fatalities reported for youth under age 20 between 1995-2000. The most common mechanisms of work-related agriculture deaths were overturning vehicles and machines, falls or run-overs from vehicles and machines, and being caught in running equipment (40% of all deaths, Hard et al., 2002).

Machinery and animals are also leading causes of non-fatal injuries on United States farms and/or ranches. Tractors have consistently accounted for the majority of non-fatal injuries (26% of injuries treated in emergency departments for the period 1978-1983 and 21% for the period 1990-1993), followed by "other types" of agricultural machinery/equipment (tillage equipment, combines, elevators, wagons, tow chains, forklifts, fertilizers, silo loaders). The proportion of injuries from "other machinery" sources declined from 54% in 1978-1983 to 25% in 1990-1993 (Rivara, 1985, 1997).

Estimates of animal-related sources of non-fatal injuries range between 17-43%: 19% of agricultural injuries to all ages (Hard et al., 2002); 17% of work-related agriculture injuries to youths less than 20 years old (CDCP, 1998); 36% of operation-related agriculture injuries to Midwestern youths less than 20 years old (Gerberich et al., 2001); and 43% of agricultural injuries to Midwestern youths less than 19 years old (Cogbill et al., 1985). Other sources of non-fatal agricultural injury include non-powered hand tools (15% of work-related agriculture injuries to youths less than 20 years old (CDCP, 1998); 8% of non-fatal agricultural injuries overall (Hard et al., 2002); floors/other surfaces and building structures (15% of work-related agriculture injuries to youths less than 20 years old (CDCP, 1998); 34% of agricultural injuries to youths less than 19 years old (Bancej and Arbuckle, 2000); almost 50% of injuries to children under the age of 6 years (Stueland et al., 1991); and general agricultural sources and horseplay/bystanding (Gerberich et al., 1991; Myers and Hendricks, 2001). For all aged agricultural workers, activity at the time of non-fatal injury was most frequently livestock handling (29%), operation maintenance (17%), and field work (16%) (Hard et al., 2002); the majority of tractor-related injuries occurred while persons were mounting/dismounting (Lee et al., 1996). For youths younger than 20 years old, causes of non-fatal injury was most frequently falls (22%), followed by off-road transportation incidents (15%), and being struck by objects (11%) (Myers and Hendricks, 2001). In contrast, major sources of non-agricultural injury reported for all ages included sports and recreational sources, vehicles other than agricultural machinery, home activity sources, and surfaces involving falls (Gerberich et al., 2001; 1991).

Marlenga et al. (2004) found the most common mechanisms of childhood injury fatalities were roll-overs (27%), run-overs (22%), and machinery entanglements (13%). The most common mechanism resulting in injury hospitalizations was machinery entanglements (42%) and the most common mechanisms of restricted activity injuries were being struck by an animal (17%) or being cut/pierced by an object (16%). Hagel et al. (2004) found that the majority of hospitalized machine-related agriculture injuries in Saskatchewan, Canada, were primarily due to three mechanisms of injury: entanglements (34%), being pinned by or struck by a machine (22%), and falls from a machine (22%).

The differences in injury rates associated with types of agricultural operations are potentially due to differences in exposure to agricultural hazards, i.e., sources and mechanisms. The fatality rate for crop production operations was three times greater than for livestock operations (37.9 vs. 14.1 per 100,000, Hard et al., 2002), but differences in non-fatal injury rates by type of production are inconsistent; differences have either not been observed (crop = 7.7/100, livestock = 7.4/100, Hard et al., 2002) or have been observed to be higher for livestock operations. For instance, compared to crop operations, livestock operations are associated with the most non-fatal injuries, the highest household injury rate per 100 youths, and highest work-related injury rate per 100 working youths (16,981 vs. 12,338, 2.17 vs. 1.59, and 1.19 vs. .59 for livestock and crop operations, respectively) (Myers and Hendricks, 2001). For adult workers, Sprince et al. (2003) also reported an increased risk of work-related agriculture injury with the presence of large livestock (odds ratio [OR] = 1.77; 95% confidence interval [CI] = 1.24-2.51).

Even non-working children from agricultural households are at increased risk of agricultural injury, and in fact, the USDA-NASS (2004) reported that childhood agricultural injuries are most commonly not work-related (63%). Stueland et al. (1996) reported that 32% of the youths in their study were injured while observing others work. Of the restricted activity injuries that Myers and Hendricks (2001) reported for youths less than 20 years old who lived, visited, or were hired to work on United States operations in 1998, 55% were not related to work or chore activities on the operation. The same survey conducted two years later found that 66% of the injuries to youths who lived on the operation were not work-related (1.97 injuries per 1,000 household youths who worked; 1.27 per 1,000 household youths who didn't work) (Hendricks et al., 2004). Pickett et al. (2005) reported that 70% of the youths in their study were not working when their injuries were incurred, although agricultural work was involved in 54% of the injury events. The most common mechanisms of agricultural injuries to non-working children were playing at the work site (47%) and being a bystander to or extra rider on agricultural machinery (35%) (Pickett et al., 2005). Being a passenger or bystander to agricultural machinery were the most common activities for fatalities (44%), and recreational horseback riding was the most common activity for restricted activity injuries (37%) (Pickett et al., 2005). Parents who themselves perform agricultural work are hypothesized to be unable to adequately supervise non-working children (Stueland et al., 1996; Pickett et al., 2005). Similarly, parental distraction by seasonal increases in machinery-related chores has been suggested as a cause of machinery-related deaths to children younger than six years old, which occur more often in the spring and fall (CDCP, 1999).

Consequences and Costs of Agricultural Exposures

Health-related consequences of being exposed to agricultural hazards include traumatic deaths, non-fatal injuries, musculoskeletal and respiratory disorders, several types of cancer (lip, stomach, skin, prostate, brain, soft-tissue sarcoma, leukemia, lymphoma, and multiple myeloma) (Cordes and Foster, 1988; May, 1990), hearing loss (Karlovich et al., 1988) and infections following lacerations (Brennan et al., 1990). Although agricultural operations with 11 or more employees had the highest rates of skin diseases, respiratory conditions, and poisonings across all occupational sectors in 2002 (NSC, 2004), non-fatal injuries were the most commonly reported health condition experienced by agricultural workers.

Like all injuries, the source of injury influences its severity. For example, using NEISS data, Rivara (1985) reported that silo loaders had nearly 10 times the proportion of most severe injuries than any other source. Gerberich et al. (2001) reported that 54%

of non-fatal agricultural injuries among children in agricultural households, resulting in one month or more of restricted activity, involved animals and an additional 23% involved machinery. Cogbill et al. (1991) reported that the most common sources of permanent disability for 739 trauma center patients who had incurred an agricultural injury were corn pickers (62%), power take-offs (45%), tractors (20%), and animals (7%). The National Safety Council (1986) reported that 48% of permanent injuries were caused by agricultural machinery, primarily due to power take-off entanglement.

Injuries involving days away from work most commonly affected the back (20%), lower extremities (11%), multiple body parts (9%), and fingers (8%) (NSC, 2004). Rivara (1997) reported that fatal agricultural injuries to children most commonly affected the head (40%), brain (24%), and trunk (26%) – head, face, and neck injuries being more common among the youngest group of children. Non-fatal agricultural injuries incurred by children are most commonly lacerations, fractures, and scrapes/abrasions to the hands, head, and legs (Myers and Hendricks, 2001). The CDCP (1998) reported that non-fatal work-related agriculture injuries among 0-19 year olds who were treated in United States emergency departments most commonly affected the fingers and hands (24%), followed by the knee, ankle, or foot (23%). A population-based study of Midwestern youths 0-19 years old reported similar sites of injury: hands/fingers/thumbs (23%), legs (12%), feet/heels/toes (12%), arms/elbows/wrists (11%), and spines/backs (11%) (Gerberich et al., 2003). The site of the injury is associated with age: 57% of injuries to children younger than six years old were to the head and neck compared to 21% of the injuries to children between six and 18 years old age (Stueland et al., 1991).

The consequences of United States agricultural injuries create an enormous burden on health care resources and significantly reduce industry productivity. Costs associated with occupational agricultural illnesses (respiratory, infections, skin, and mental health) are not compiled, but the direct and indirect costs for the hospitalization and rehabilitation of United States agricultural injuries in 1992 for all ages were estimated to be $4.6 billion – comparable to the overall cost of Hepatitis C in 1997 (Leigh et al., 2001) and to the costs of job-related cancers, circulatory diseases, and chronic obstructive pulmonary disease in 1999 (Leigh et al., 2003).

From a series of Midwestern population-based studies, it was reported that approximately 80% of children who experienced an agricultural injury sought health care; most injuries were treated in a doctor's office (53%), and 3%-8% of the injuries were hospitalized (Gerberich et al., 1998; 2001; 1993; 1991; Lee et al., 1996). The impact of children's injuries on non-medical costs – for example, the productivity of the agricultural operation – was also significant: 17% reported activity restrictions lasting one week to less than one month, 17% reported restrictions lasting one month to three months, 6% reported restrictions lasting three months or more, and 5% reported persistent problems, including permanent disabilities (Gerberich et al., 2001). In their review of agricultural injury and disability, Reed and Claunch (2000) reported that 10%-41% of non-fatally injured children incurred a persistent disability.

Children Are Disproportionately Affected

Although agriculture is acknowledged to be one of the most hazardous industries in the United States, it is not often highlighted that children are disproportionately affected by exposures to agricultural hazards – they are injured more often, and their injuries are more serious (Castillo et al., 1994; Dunn and Runyan, 1993). For instance, compared to young workers in the general private sector, young agricultural workers are three times more likely to be fatally injured (Hard et al., 2002). While only 8% of working youth are employed on farms and/or ranches, 40% of fatally injured workers younger than 18 years of age die while doing agricultural work – a higher proportion than in any other industry (AAP, 2001; BLS, 2000a; Perry, 2003). Childhood agricultural injuries are also more severe than those incurred in other industrial sectors. For instance, agricultural injuries accounted for 7% of workers' compensation claims in Washington state overall but accounted for 50% of all severe injuries and 48% of all disabling injuries for workers aged 13 years or younger (Heyer et al., 1992).

Studies of work-related injuries to youth, in general, have reported occupational injury rates for older teen males that are double that for all adult workers (Knight et al., 1995). Specific to agricultural injury, researchers have also reported that when injury rates are adjusted by exposure time, such as hours worked on their own agricultural operation, working children are at equal or greater risk for injury than are working adults (Field and Tormoehlen, 1982; Gerberich et al., 2004).

Profile of Agricultural Operations

The structure of United States agriculture and the factors driving its productivity have changed dramatically during the past century. These factors are closely associated with the hazards to which workers are exposed and the types of injuries they incur. Agricultural productivity, historically achieved through human and animal labor, was transformed by tractors and machines, during the 1920s, and by land use policy that encouraged the conversion of governmental lands in the Great Plains and Western United

States to agricultural uses (USDA-NASS, 2001). By the 1960s, productivity was achieved through biological and chemical sciences and improved management practices; government price supports encouraged investment in large agricultural equipment that increased specialization and decreased the number of operations needed to supply agricultural products, thereby, concentrating the market value of agricultural production in fewer operations (USDA-NASS, 2001). Between 1950 and 1997, the number of United States operations decreased by approximately 3 million, while the average size of an operation increased over 200 acres (USDA-NASS, 2001). In the period between 1978 and 2002, the number of United States agricultural operations decreased 6% overall (from 2.26 to 2.16 million operations) and the average acreage of agricultural operations decreased only slightly (from 449 to 441 acres); yet the number of operations with less than 50 acres increased 27% (from 542,787 to 743,118 operations) and the number with 2,000 or more acres increased 19% (from 63,301 to 77,970 operations) (USDA-NASS, 2005). During this same period, the percentage of agricultural operations owned by families or individuals also increased slightly (from 87% to 90%) (USDA-NASS, 2005).

The number and density of animals per operation have also increased dramatically – along with health consequences that potentially affect both agricultural workers and the larger rural community. Hazards to workers include longer hours of exposure to animals and increased repetitive motion activities, resulting in fatigue and ergonomic stresses (Olenchock and Young, 1997) and reduced time available for performing safety and maintenance routines (Jansson, 1992). Hazards affecting both workers and the surrounding community include increased odor, pollution from excess nitrogen, and zoonotic pathogens entering the ground and surface waters (Olenchock and Young, 1997).

Agricultural Regulations and Guidelines

Agricultural operations are unique in that even non-working children are exposed to occupational hazards that are largely unregulated. Although public policies affecting agricultural health and safety are well developed in several European countries, and even Ontario, Canada, they are limited in the United States (Donham and Storm, 2002). The United States has two primary sets of regulations related to health and safety: the Fair Labor Standards Act (FLSA), enacted in 1938 to protect youths' educational opportunities and health and safety, and the Occupational Safety and Health Act (OSHA), enacted in 1970 to protect the safety of workers of all ages. Despite agriculture being one of the most hazardous of all industries and young agricultural workers experiencing a disproportionate share of occupational injuries, agricultural operations are mostly exempt from both the FLSA and OSHA standards. Layde (1990) has suggested that the limited advancement seen in occupational health and safety in the United States' agricultural sector is due to the absence of a traditional "worker versus employer" negotiation system. It is very conceivable that this dynamic exists on the family operation, where labor negotiations between children and parents in their roles as "worker versus employer" have no precedent.

The FLSA permits children of any age to perform any task on their family operation. Additionally, children aged 12 and older are permitted to work on other operations with the consent of their parents, and children are permitted to perform hazardous tasks at younger ages than allowed in any other sector (U.S. Department of

Labor, 1990). Similarly, OSHA regulations apply only to businesses with more than 10 non-family employees – only 10% of all United States farms and/or ranches (USDA-NASS, 2005). Being exempt from safety and labor standards potentially increases the hazardousness of family operations. For example, tractors are a major source of agricultural injury; yet, OSHA only requires ROPS for post-1976 tractors if they are operated by non-family employees. Similarly, entanglement in power take-offs is responsible for a large proportion of severe agricultural injury, and shields are only required around power take-off shafts if more than 10 non-family workers are employed on the operation. The OSHA exemptions, in particular, increase the hazardousness of the environment for non-working children who are exposed to agricultural hazards by living on or visiting agricultural operations or by accompanying a working parent.

Even with over 90% of United States farms and/or ranches exempt from FLSA and OSHA standards, effective investigation and enforcement of agricultural labor violations are not possible given the level of resources that the Department of Labor's Wage and Hour Division has available for FLSA enforcement. As of 1999, less than 3% of all inspections were made in the agricultural sector, none of the enforcement officers were dedicated exclusively to child labor, and only twenty-three officers were designated as agricultural labor specialists, responsible for the entire 50 states (Tucker, 2000). The inadequacy of the dedicated resources is reflected in the following numbers: in 1998, of the one million child labor violations that were estimated as being incurred by the 10% of applicable United States agricultural operations, only 104 (.01%) were cited (Tucker, 2000).

Additional safety regulations pertaining to older teens and youths from agricultural households have only recently been promoted. The North American Guidelines for Children's Agricultural Tasks (NAGCAT) are voluntary guidelines, developed by a national work group to assist agricultural families in assigning safe and appropriate jobs to children by matching the developmental requirements of agricultural tasks with a child's abilities (Lee and Marlenga, 1999). The NAGCAT guidelines apply to children aged 7-16; children younger than seven years old are not considered developmentally ready to engage in productive agriculture work. The guidelines cover 62 agricultural tasks grouped into the following seven areas: animal care (e.g., milking cows with a pipeline); haying operations (e.g., baling hay); implement operations (e.g., using an auger wagon); manual labor (e.g., picking rock); specialty production (e.g., harvesting tobacco); general activities (e.g., repairing fences); and tractor fundamentals (e.g., connecting a power take-off to other equipment). A recommended level of supervision (constant, nearly constant, intermittent, and periodic) and an age range "appropriate to perform the task" (7-9, 10-11, 12-13, 14-15, and 16 years old or older) are provided for each task covered by the guidelines.

The American Academy of Pediatrics (AAP) has recently recommended an additional set of voluntary regulations: these are that children younger than 16 be restricted from driving any agricultural vehicles; children younger than 18 be restricted from driving a tractor not equipped with ROPS and seatbelt; and children aged 16 or older be required to have a valid driver's license before operating a tractor on a public roadway (AAP, 2001). The AAP's regulations were supported by Pickett el al. (2005), who also recommended creating developmental guidelines for common recreational activities on farms and/or ranches.

The effectiveness of the NAGCAT age guidelines to prevent childhood agricultural injuries has been recently evaluated using case series data. Marlenga et al. (2004) estimated that 60% of the work-related agriculture injuries would have been totally preventable if the guidelines had been followed. "Preventability" varied by severity: 80% of fatalities and 35% of restricted activity injuries were judged to be completely preventable. The FLSA has never been evaluated, despite significant proportions of young workers incurring occupational injuries while performing prohibited tasks – an estimated 38%-86% of fatal injuries (Castillo et al., 1994; Dunn and Runyan, 1993; Suruda and Halperin, 1991) and 14%-19% of non-fatal injuries (Dunn and Runyan, 1993; Knight et al., 1995).

Relevant Theoretical Frameworks

In their review of childhood agricultural injury research, Stallones and Gunderson (1994) reported that most investigators do not explicitly identify the theoretical framework they use, although the use of the host-agent-environment model was evident (host referring to the individual and agent referring to forms of mechanical, chemical, electrical, or thermal energy transferred to the host by a vector or vehicle such as machinery, animals, a firearm, etc.); other injury data were presented according to characteristics of person, time, and place. To better focus analytical agricultural research, Stallones and Gunderson (1994) recommended that the Haddon Matrix (Haddon, 1972, 1980b, 1999) be used to classify host-agent-environment risk factors by the time period during which they can be influenced – before, during, or after the occurrence of the injury event. For instance, the Haddon Matrix would be used to identify pre-event factors that prevent injury, factors at the time of the injury that minimize its severity, and post-event factors that maximize the quality of life of the injured person. Stallones and Gunderson (1994) also recommended that factors unique to agriculture be included in analytical models and research efforts, for example, the sociocultural factors suggested by Rivara (1985): parental health beliefs and locus of control, parental knowledge of child development stages; and parental safety behaviors.

The Threshold Theory of Injury Causation models injuries as occurring when the skill demands of an energy vector exceed an individual's performance capabilities (Waller and Klein, 1971). This mismatch between skill requirements and capability is a potential contributor to childhood work-related agriculture injuries; a child may not be developmentally ready to perform a task at the skill level required to accomplish it safely. Motor and cognitive abilities, such as strength, coordination, dynamic balance, visual tracking, information processing, object permanence, and judging threats correctly, are poorly developed in younger children but mature as they age (Rivara and Howard, 1982; Schieber and Thompson, 1996).

The field of child development has much to offer injury researchers. Most fundamental are models of how perceptions are influenced by information from the environment and by properties of the developing child. For example, Adolf and Eppler (1999) found that infants who had learned that a sloped ramp was safe for crawling paid no attention to the slope and walked over its edge when they began walking. They concluded that although the space didn't change, it must be mapped into the new motor space that controls standing posture and walking. Recent child development research has focused on how psychosocial and cognitive development co-occur and interact. For example, Steinberg (2004) asserted that self-regulation may influence adolescent risk taking more than immature risk perception/appraisal. He described a "window of vulnerability" between puberty and early adulthood – when sensation seeking increases because adolescents require more stimulation to achieve the same subjective feelings of pleasure, but the self-regulatory competence to modulate reward-seeking impulses has not fully matured. There may be other windows of vulnerability in development when a child or adolescent is not ready to function independently in a new context or activity, such as when a child first learns to walk or climb or an adolescent first learns to drive; developmental scholars suggest that children need support or "scaffolding" to bridge these maturity gaps (Masten, in press; Steinberg et al., 2006).

The existence of gaps in developmental maturity between when new activities are tried and when the cognitive judgment or experience to execute them safely is acquired has not been examined for work-related agriculture injuries (Runyan and Zakocs, 2000). However, if youth begin performing agricultural work before the developmental maturity or experience required for the tasks is acquired, the risk of injury may be greater. If a youth's judgment depends on mature thinking, which is based on brain and cognitive development, then judgment may not be malleable until the youth matures. As a consequence, training or experience, alone, may not protect youths from the risk of immature judgment. Effective injury prevention may call for limiting the opportunities for immature judgment to have harmful consequences (Steinberg, 2004).

Potential Risk Factors

Gender and Age

Males account for 85% of the agricultural fatalities reported for youths less than 20 years old between 1982-1996 (Adekoya and Pratt, 2001), 80% of the agricultural fatalities reported between 1995-2000, and 86% of the work-related agriculture injuries incurred by children less than 20 years old that resulted in an emergency department admission between October 1, 1995 and September 30, 1997 (CDCP, 1998). The mortality rate for rural children is 5.7 times higher for males than females (21.5 vs. 3.8 per 100,000, Rivara, 1985), and the male:female gender ratio of the non-fatal agricultural injury rate for residents of agricultural operations is reported to be 1.6 (CDCP, 1998; Gerberich et al., 2001) to 2.1 (Myers and Hendricks, 2001) .

These differential rates are potentially related to gender-related differences in exposure to types of agricultural activities performed and/or number of hours worked (Gerberich et al., 2003; Schulman et al., 1997), risk-taking behavior (Bijttebier et al., 2003), parental expectations about when adolescents are ready to perform tasks (Dekovic et al., 1997), or differences in supervision. Findings on these factors have not been consistent. For example, Gerberich et al. (2004), through a large population-based study, found that females younger than 20 years of age had rates of injury that were 5% (in 1999) and 10% (in 2001) higher than rates for males of the same age, after adjusting for hours worked on their own operation. An analysis of National Electronic Injury Surveillance System data found a reverse differential for injuries treated in United States emergency departments that had been sustained during the performance of agricultural work (2.4 per 100 male FTEs and 1.5 per 100 female FTEs, after adjusting for hours worked) (CDCP, 1998); however, such injuries account for only 20% of injuries identified in large population-based studies.

Bijttebier et al. (2003), observed that boys showed more risk-taking behavior than girls, possibly due to differences in activity levels or beliefs about risk/vulnerability. Schulman et al. (1997), reported that males are exposed to twice as many hazards as are females and suggested that children working in the agricultural sector are channeled into gender-specific tasks as they age. For example, males were more likely to use agricultural equipment such as power take-offs, 3-point implements, and trailed implements (Marlenga et al., 2001) and be injured by tractors, implements structures, and tools (Stueland et al., 1991). In contrast, females were more often assigned to animal care (Marlenga et al., 2001) and injured by animals (Stueland et al., 1991). Hard et al. (1999b), reported that, compared to males, females accounted for a smaller percentage of total production-related agriculture deaths, but a higher proportion of deaths due to animals and being caught in running equipment; males had a higher risk of death by animals and were killed by animals with greater frequency. Hard et al. (1999b), also reported that compared to female workers in other industries, female agricultural workers have a three-fold greater risk of death.

Age influences the pattern of childhood agricultural injury, possibly due to age of exposure to environmental hazards. Age of exposure could be influenced by children's mobility and initiative, local norms or parents' judgments about when children are ready, agriculture guidelines, or governmental regulations and laws. The likelihood of agricultural injury is similar for both genders aged 0-6 (Stueland et al., 1991), although compared to females of the same age, males younger than six incur a higher proportion of machinery-related agriculture injuries (CDCP, 1999).Among children less than 20 years of age, nearly 40% of agricultural deaths among males were incurred by 15-19 year olds and nearly 40% of the deaths among females were incurred by 0-4 year olds (Adekoya and Pratt, 2001). The likelihood of childhood agricultural injury increased with age for males (Goldcamp et al., 2004; Stueland et al., 1991; Stueland et al., 1996) and decreased with age for females (Stueland et al. 1991; 1996). Several age groups have been reported to be at higher risk of injury: youths aged 18-19 years old were found to incur the highest number of work-related injuries (Myers and Hendricks, 2001); youths less than 10 years of age incurred the highest number of agricultural injuries, overall, and the highest work-related injury rate (1.4 injuries per 100 workers), and shared the highest rate of injury with 12-13 year olds (two injuries per 100 youths) (Myers and Hendricks, 2001). Cogbill et al. (1985), and Stueland et al. (1991), reported bimodal age distributions, peaking around the ages of three to eight years and 13-18 years. Stueland et al. (1996), reported highest injury rates for Wisconsin males aged 14-17 years old (2.72 per 100 operation resident children). Gerberich et al. (1998; 1993), found the highest Midwestern injury rates were incurred by males who were 5-9, 10-14, and 15-19 years old (11, 8, and 6 per 100,000 hours worked, respectively) and the highest rates for females were for 25-29, 10-14, and 5-9 year olds (8, 7, and 6 per 100,000 hours worked, respectively). Goldcamp et al. (2004), calculated that youths less than 16 years of age accounted for 45% of the work-related agriculture fatalities and 71% of the non-work-related agriculture fatalities.

Developmental and Behavioral Factors

Although the associations between cognitive, physical, and behavioral risk factors and unintentional injury are being examined in research, their associations with *agricultural* injury rarely are analytically examined. Developmental and/or behavioral factors such as children's relative inexperience, immature motor skills, immature decision-making, or the presence of a learning or behavior disorder have been suggested to increase the risk of childhood agricultural injuries (Cogbill et al., 1985; Stueland et al., 1991; Rivara, 1997). When children are exposed to occupational hazards in agricultural settings, additional factors that may influence the risk of injury include behavioral self-control, motor coordination, attention skills, a lack of understanding consequences, feeling invulnerable to risk, or not being able to control impulsiveness. These may be particularly important when a child's physical appearance conveys greater maturity than the child has in terms of decision-making and self-regulation abilities (Schulman et al., 1997).

The association between developmental factors and injury is likely confounded by multiple factors. For example, impulsivity is perceived as increasing the risk of childhood injury. Impulsive, active children are more likely to overestimate their physical abilities than are non-impulsive children (Plumert and Schwebel, 1997; Schwebel and Plumert, 1999). Because accurate estimation of physical abilities (for example, how far a person can reach or step) is associated with decreased injury rates (Plumert, 1995; Plumert and Schwebel, 1997), it may be difficult to differentiate the role of overestimation and impulsivity for risk of injury.

Another potential confounder is the "opportunity for injury." For example, although uncoordinated children are perceived to be more injury-prone than coordinated children, only one study has found an association between poor motor skills and increased injury (children aged six-nine, Angle, 1975). Most commonly, poor motor skills are not associated with unintentional injury (Langley et al., 1980a; Schwebel et al., 2003), and being strong and athletic has been associated with an increased risk of injury (Langley et al., 1980b; Manheimer and Mellinger, 1967). Schwebel et al. (2003) suggested that the association between motor ability and injury risk may be confounded by "opportunity for injury." That is, coordinated children may be active more frequently than uncoordinated children. Bijttebier et al. (2003), found that the "opportunity for injury," in the form of increased risk-taking behavior, mediated the relationship between "difficult temperament" and injury liability, suggesting that the higher injury rates reported for "difficult" children are potentially explained by their increased risk-taking behaviors.

Previous Injuries and Family Structure

Having experienced an injury has been identified as a risk factor for subsequent injuries by multiple researchers (Browning et al., 1998; Elkington, 1990; Gerberich et al., 2003; McGwin et al., 2000; Westaby and Lee, 2003). Browning et al. (1998) suggested that the association reflects the long-term effects of prior injuries, such as permanent disability, that potentially affect the ability to work. Westaby and Lee (2003), suggested that "well-learned and automated behavioral routines" or exposures to potential hazards can outweigh even high levels of safety awareness and that some individuals may not be learning or changing from past injury events. Gerberich et al. (2004), and Rivara (1985), suggested that the association reflects a continuous exposure to more hazardous work environments, within which Rivara includes social and behavioral factors.

The association between parent/sibling injuries and childhood agricultural injury is also potentially explained by environmental mechanisms or by shared behavioral/risk-taking practices. Carlson et al. (2006), found that, compared to children for whom neither parent reported a previous injury, children with parents reporting a previous agricultural injury, had increased odds of agricultural injury ($OR_{\text{father's previous injury}} = 2.1$, 95% CI – 1.5, 3.0; $OR_{\text{mother's previous injury}} = 2.5$, 95% CI = 1.7, 3.8; $OR_{\text{both parent's previous injury}} = 4.2$; 95% CI = 2.6, 6.9). Johnston et al. (2003), reported that children's medically treated injuries were associated with a two- to six-fold increase in sibling risk of injury. Age and number of siblings modified the association: no association was observed among children 0-4 years of age, and a stronger association was observed for families with two versus more children. Further, a temporal variation in risk was observed, with the relative risk of sibling injury peaking within 10 days of the initial child's injury and returning to baseline by 30 days after exposure.

Lee et al. (1997), found that an increased number of family members working on the operation increased the likelihood of children being exposed to agricultural hazards. Although family size potentially confounds the relationship between previous injuries incurred by family members and the risk of childhood agricultural injury due to the greater opportunity for exposure of family members to agricultural hazards, a mechanism is suggested by Schwartz et al. (2005). Schwartz et al. (2005), found that children from families in Jerusalem with four or more children had an increased risk of injury; they were less often cared for by an adult, were more often in the presence only of other children at the time of their injury, and had longer gaps between the time of injury and getting help. They concluded that the increased risk was at least partially related to inadequate supervision and that parents may be unable to safely supervise more than three children at once.

Dekovic et al. (1997), found that, compared to younger adolescents and their parents, older adolescents, as well as their parents, held "older" age expectations for the achievement of developmental tasks. They hypothesized that parents and adolescents both overestimate the adolescent abilities in areas in which they have no prior experience, and that expectations become more realistic as adolescents actually initiate developmental tasks. This suggests the possibility that injury-related mechanisms may be associated with the parenting experience of parents. Compared to parents with two or more children, first-time parents may overestimate a child's abilities and, as a consequence, may not provide adequate supervision while the child plays near agricultural hazards, or first-time parents may assign agricultural tasks that are not developmentally appropriate. This possibility is supported by associations observed between birth order and preventive attitudes, beliefs, and behaviors: attitudes towards injury were more predictive of injury prevention behaviors for parents of older, first-born children than for those with later born children; outcome expectations and social norms were more predictive of injury prevention behaviors for parents of preschool children than for parents of younger children (Vladutiu et al., 2006).

Safety Education and Training

Educational strategies are the most common types of safety interventions offered and evaluated in agriculture (DeRoo and Rautiainen, 2000) and in workplaces in general, even though combined educational and environmental strategies may be more effective (Haddon, 1980a, 1980b; Hartling et al., 2004; Lee et al., 2001; Runyan and Zakocs, 2000). The utility of engineering or regulatory approaches that preclude behavior change is also widely recognized as a preventive strategy (McCurdy and Carroll, 2000). Educational strategies usually assume that injury-causing behaviors decrease through increased awareness, protective attitudes/beliefs, and knowledge and/or through decreased risky attitudes/beliefs. For example, Harrell (1995) reported that risk-taking attitudes and beliefs about the inevitability of injury events were associated with agricultural injuries, and also that safety practices, such as the use of protective clothing and operating machinery safely, were associated with lower injury risk. After reviewing eleven agricultural safety educational interventions, DeRoo and Rautiainen (2000) concluded that there were post-program increases for agricultural safety knowledge, safety attitudes, and safety behaviors and/or intentions, but also that the evidence for program effectiveness was weak. Their review noted inadequate study designs as well as a lack of significant differences found in the incidence of injuries among operators who had ever participated in any type of safety training program compared to non-participants.

Equipment Modification/Personal Protective Equipment Use

Engineering controls, including equipment and machinery shielding and ROPS, reduce the risk of agricultural equipment-related injury (Reynolds and Groves, 2000; Rivara and Alexander, 1994). Installed ROPS are effective injury protection during tractor overturn incidents, and if all older tractors were retro-fitted, the fatalities associated with tractor overturns would be reduced by an estimated 99% (Hallman, 2005). Unfortunately, less than 40% of all tractors in operation in the United States have a ROPS, and the proportion varies inversely with the age of the tractor (Schenker et al., 2002). In a study examining the level of financial incentive required to motivate operators to install ROPS on non-ROPS equipped tractors, the "hassle factor" was found to be a significant obstacle to retrofitting, no matter the level of financial subsidy (Hallman, 2005).

Research on other types of safety practices is limited. Stueland et al. (1996), reported an increased risk of injury (OR = 2.64; 95% CI = 1.10-6.35) for disabled safety devices. A telephone survey of 1,947 California agricultural operators found that routine seat belt use was reported for only 7% of the operations' most used tractors, enclosed cabs for 16%, and shielded power take-offs for 74% (Schenker et al., 2002). A survey of 2,483 Midwestern operations found that 68% of the operators handled large animals in barns and yards on a daily basis and 32% worked in animal confinement housing, but that personal protective equipment, such as steel-toed boots, heavy gloves, dust/mist masks, air purifying respirators, and safety goggles, was rarely used (Carpenter et al., 2002).

Research on the association between safety beliefs and agricultural safety practices is also limited. Schenker et al. (2002), found that safety practices decreased with each successive piece of equipment used and increased with operators' increased concern about potential hazards or health conditions. Carpenter et al. (2002), found that personal protective equipment was used to avoid injury and exposure or to minimize current health problems. Wadud et al. (1998), found that Missouri operators who felt they were susceptible to hearing loss, respiratory problems, or skin diseases related to agricultural exposures were most likely to use hearing, breathing, or skin protection if they believed these problems could be avoided and, thus, identified fewer obstacles to prevent them.

Supervision/Monitoring

From a developmental perspective, one of the primary sources of injury control for young children is their parents (Peterson and Stern, 1997). Although parents readily accept their responsibility in preventing childhood injury (Peterson et al., 1987), little is known about the strategies parents use to keep children safe or the factors that influence these strategies. Parents are thought to use three types of strategies to protect children from unintentional injuries in general: (a) injury socialization or teaching children to recognize hazards and use them safely and correctly (acquired through supervision, responsive parent-child interaction, and making and rehearsing family safety rules, Peterson and Stern, 1997); (b) modification of the environment (Morrongiello et al., 2004a, 2004b); and (c) supervision and/or directly intervening between children and potential hazards. Parents likely use similar safety strategies on agricultural operations where they are also occupational supervisors.

Supervision has three components: attention, physical proximity/readiness to intervene, and duration/frequency (Morrongiello, 2005). The need for supervision varies with children's ages and the hazardousness of the environment. Although laws exist for the minimum age at which children can be left unsupervised, there are no guidelines or even "community norms" for appropriate levels of supervision in general (Peterson et al., 1993), or specific to the agricultural environment. A large proportion of early childhood injuries are associated with behaviors and environmental hazards that are not easily anticipated and are only avoidable if the child is closely monitored (Peterson et al., 1987; 1993).

Morrongiello and others (Morrongiello and House, 2003; Morrongiello et al., 2004a, 2004b; Morrongiello, 2005) have conceptualized and measured supervision and assessed its association with injury risk, in general. Inadequate parental supervision has been associated with children's unintentional injuries (Morrongiello et al., 2004a, 2004b; Morrongiello, 2005); but, physical proximity has been found to be the only behavior directly related to injury risk (Morrongiello and House, 2003). Parental attitudes, beliefs, and values, such as, protectiveness, worry about children's safety, and confidence about being able to keep a child safe, are associated with both supervisory behaviors and decreased risk of injury (Morrongiello and House, 2003; Morrongiello, 2005). Underlying attributes such as parental conscientiousness, being well organized, having high standards, and always striving to achieve goals, are found to be related to children's risk-taking and injury history but not to parental supervisory behaviors. These relationships are potentially explained by general patterns or parenting styles being better predictors of a child's well-being than specific parenting practices (Morrongiello, 2005). For example, parents may provide "scaffolding" or extra support during periods of vulnerability when children are asked to perform new tasks but are not developmentally able to execute them safely (Masten, in press). Parents potentially manage injury risk through appropriate supervision or by modifying the environment, providing safe practice opportunities, and teaching safe behaviors.

Two mechanisms have been suggested for how children incur agricultural injuries; these are likely to shift in salience during development (Mason and Earle-

Richardson, 2002; Rivara, 1997): younger children may be injured while not being adequately supervised by parents who are engaged in performing agricultural work (Pickett et al., 2005) and older children may be injured while the children are engaged in performing agricultural work. The interaction between children's development and how they are supervised is a critical component of either pathway, but neither factor, nor its interaction, has been measured in agricultural injury research. The association between supervision and childhood agricultural injury has been implicated as a risk factor for injury in studies of children whose parents are both agricultural operators (Bancej and Arbuckle, 2000) and children who are supervised by a caregiver at the agricultural work site versus being supervised at home (Pryor et al., 2002). Bancej and Arbuckle (2000) also found that mothers' off-site employment was protective for children, aged 0-4, but was a risk factor for children 5-9, suggesting that off-site employment may increase the likelihood of supervised child care for preschoolers but decrease the supervision available to school-aged children.

To protect young children and non-working youth from agricultural hazards, the establishment of safe play and recreation areas set apart from the work site and affordable, accessible child care alternatives have been recommended (Lee et al., 2002; Pickett et al., 2005; Stueland et al., 1996). Pickett et al. (2005), also recommended instituting safe storage practices and developing guidelines for recreational activities undertaken on agricultural operations.

Limited research exists on the quality and quantity of supervision in occupational settings, particularly for youth working in agriculture. In a review of coroners' files and hospital discharge data for a five-year period ending March 31, 1990, Pickett et al.

(1995), found childhood agricultural injury risk to be associated with inadequate supervision of young children, such as allowing children to be in the area of moving or unguarded machinery or allowing children to accompany workers using agricultural machinery. In a survey of children's exposures to agricultural hazards in Iowa, Hawk et al. (1991), reported that 40% of children younger than 18 years old who operated agricultural equipment did so without supervision and that 30% of children over age three were unsupervised while playing alone in work areas. In a 1993 descriptive analysis of supervision in Iowa, older children were frequently supervising their siblings younger than 10 years old at the time the younger sibling was injured (31% of the injury events) and 79% of parents were occupied with agricultural activities at the time of the child's injury (Sebille et al., 1997).

For work-related injuries across all industries, Knight et al. (1995), reported that 80% of teens who were injured and treated in emergency departments were not supervised at the time of injury. Greenberger and Steinberg (1986) reported that the average teenage worker is in the immediate vicinity of any adult only 22% of the time and only near a supervisor 12% of the time. Because supervision has been neglected in research on agricultural injury to children, there is a clear need for research on its association with injury, as well as its linkages to parental attributes and safety practices. Moreover, given that parental attributes, safety practices and supervision all are believed to influence multiple protective practices (Morrongiello, 2005), their effect on agricultural injuries to children is best evaluated by looking at their simultaneous influence.

Work Practice Decisions

Because federal regulations permit children on family-run agricultural operations to perform any task at any age (U.S. Department of Labor, 1990), assessing the hazards specific to a task and their children's readiness to engage in it is the responsibility of the parents (Stueland et al., 1996; Kidd et al., 1997). As parents can only fully protect their children from incurring work-related agriculture injuries by prohibiting work, the most fundamental determinants of injury are likely the decisions parents make about their children's work practices, such as whether children work, how much they work, and whether the assigned work is appropriate for the children's physical and cognitive maturity. White and Brinkerhoff (1981) found that parents assigned work, in general, to children for four major reasons: to facilitate the child's development, as part of the child's "reciprocal obligation" as a member of the family, to help the child learn the task, and because the parent needed the help. They conclude that children's work had been framed as a means of individual development and that sociological issues, such as the role of children in the family, had been neglected. The economic effect of children's agricultural work on their family or on agricultural production had been similarly neglected.

In agricultural families, children participate in the activities of other family members and are expected to do their part (Elder and Conger, 2000), including their share of work related to agricultural production. Farmers and ranchers believe that work develops children's work ethic, teaches them responsibility, allows the family to be together (Elder and Conger, 2000; Kelsey, 1994; Lee et al., 1997; Tevis, 1997), and contributes to the economic sustainability of the agricultural operation (Elkind, 1993;

Kidd et al., 1997; Lee et al., 1997; Marlenga et al., 2001). Lee et al. (1997), identified similar beliefs and found them to be associated with parents' attitudes about children's work-related agricultural exposures. Lee et al. (1997), also found that fathers' attitudes about whether agricultural tasks were good/bad, beneficial/harmful, and wise/foolish were the strongest predictor of intention to expose children younger than 14 years of age to work-related agricultural hazards.

Chore assignment is not typically based on an assessment of children's developmental ability. Parents tend to rely on their intuition when determining their child's "readiness" for a new agricultural task or increased responsibility and refer to chores they had performed as children or what safety experts recommend (Tevis, 1997). The children's request to work also influences their participation in agricultural work (Tevis, 1997). Compared to their parents, adolescents have earlier expectations about when they are ready to perform developmental tasks (Dekovic et al., 1997); yet, they are not able to accurately assess hazardous environments and may be motivated by what other children are doing and/or by their desire for parental approval.

Although children perform agricultural work or are exposed to agricultural hazards because the benefits of exposure are believed to outweigh the risks, the association between these exposures and agricultural injury has been minimally researched and the risks and benefits of agricultural exposures have not been empirically examined. Kidd et al. (1996), reported that operators' work practice decisions are "typically framed within an economic model where the costs of possible injury outcomes are not weighted heavily." In their discussion section, agricultural economists Park and Hartley (2002) were explicit that agricultural work practices are managerial decisions made by adult operators to reduce their own safety risks. These decisions include how long operators work, if they plan and organize their personal work routines to be careful if working alone, or if they ensure that another adult is present in case assistance is needed. Park and Hartley (2002) also found that the risk of work-related agriculture injury was increased for hired help, but they did not suggest that operation owners made managerial choices associated with the increased risk. The association between work practice decisions and risk of occupational injury and whether managerial work practice decisions made by agricultural operators differentially increase the risk incurred by their children or hired help is a research area that has not been examined. Acknowledging that work practice decisions are intentional managerial choices is the first step towards being able to evaluate the real costs of agricultural exposures and injuries, costs that are often implicitly accepted.

Parents may not be sufficiently protective of their children when assigning work because of a natural inclination to be positively biased about the capabilities of their own children: 43% of parents on agricultural operations reported that their children are more capable than other children of similar age and gender (Tevis, 1997). Agricultural families have been found to allow their own children to engage in high-risk activities at ages younger than what they perceived as safe for children, in general (Tevis and Finck, 1989), or at ages much younger than was thought to be developmentally safe (Marlenga et al., 2001; Pickett et al., 1995). For example, Marlenga et al. (2001), observed large proportions of children using agricultural machinery at younger ages than considered developmentally safe by NAGCAT guidelines: 37% of children were operating tractors and 24% of the children were doing fieldwork with power take-off implements. Other researchers have found that many youths began to operate tractors before they were 10 years old (Debarr et al., 1998; Tevis, 1997).

"Hours worked" is commonly used to approximate duration of exposure in analytical studies of occupational risk factors, although it has not been framed as a "managerial choice" in agricultural injury research. In a matched analysis of case-control data, working more hours per week was associated with an increased risk of incurring a work-related agriculture injury (Elkington, 1990). Gerberich et al. (2001), observed that injury rates increased from 737 to 5,357 per 100,000 persons as the average number of agricultural-work hours per week increased from less than 10 to 40 or more hours; compared to those working less than 10 hours per week, the corresponding rate ratios increased from 3.5 to 7.6 with increasing hours worked per week. Stueland et al. (1996), reported an increased risk of injury for every hour worked per week (OR = 1.05) among children less than 18 years old. For adults, Sprince et al. (2003), reported an increased risk of work-related agriculture injury for working at least 50 hours per week (OR = 1.65; 95% CI = 1.23-2.21); they also found that working part-time on the operation and working off the operation for at least 12 weeks in the past year were protective from agricultural injury (OR = 0.57; 95% CI = 0.32-0.98 and OR = 0.69; 95% CI = 0.05-0.99, respectively). Increased work hours were also found to increase the risk of injury for specific activities performed by workers, five years of age or older. Hours per week spent milking (1-10, 11-20, 21-30, and 31-63 hours) were found to be associated with dairy cattle-related injuries, resulting in rate ratios of 1.0, 2.3, 5.5, and 20.6, respectively (Boyle, 1995; Boyle et al.,1997); increased rate ratios for tractor-related (Lee et al., 1996) and machinery-related (Gerberich et al., 1998) injuries were observed for working more than 20 hours per week, compared to 19 hours or less.

In addition to duration of exposure, or "hours worked," the number of tasks a child performs may be a risk factor for occupational injury. Injury rates, in general, are found to be higher for tasks that are non-repetitive and unpredictable (Saair, 1977), which are key characteristics of agricultural tasks. For example, operators in Sweden were found to use 40 different types of machines and equipment (Jansson, 1992), not accounting for the varying geographic, climatic, temporal, lighting, and structural conditions under which agricultural tasks are performed. In a qualitative study of stress and risk of agricultural injury, operators themselves identified excessive workload (including number of roles performed by an individual, task complexity, and lack of time) and economic stressors as primary determinants of safety hazards and behaviors (Kidd et al., 1996). In a Minnesota study of adolescent workers across industries, Parker et al. (1994), found that self-report of injury was positively associated with high school aged workers engaged in one, two, and three job activities, even after adjusting for the total number of hours worked.

Another work practice, the assignment of age-appropriate tasks, has been identified as a potential risk factor for work-related childhood agricultural injuries when the assignment is beyond a child's maturity and/or developmental level (size, strength, reach, hazard recognition, problem-solving skills, minimization of impulsive or risk-taking behavior) (Gerberich et al., 2001; Lee and Marlenga, 1999; Marlenga, 2001; Marlenga et al., 2004; Mason and Earle-Richardson, 2002). The association between agricultural injury and the age-appropriateness of assigned tasks has been examined in two case series analyses from which results showed that 30% (Mason and Earle-Richardson, 2002) to 60% (Marlenga et al., 2004) of childhood agricultural injuries were associated with developmentally inappropriate task assignments.

Limited research on the factors that influence how parents assign children's work exists, and the associations between work assignments and parental knowledge and attitudes that have been examined are not conclusive. For instance, Pickett et al. (2003), found that even 20% of the parents with perfect child development knowledge scores (indicating an understanding of the developmental factors such as strength, size, recognition of hazards, maturity, etc., that are required by agricultural tasks) still assigned children to inherently dangerous agricultural work in which demands exceeded the children's capabilities. Pickett et al. (2003), concluded that increasing parental knowledge and/or instituting voluntary regulations would not be sufficient to change the practices of parents on agricultural operations.

Rivara and Howard (1982) hypothesized that children's risk of injury, in general, is related to parental ability to judge with accuracy their children's developmental skills and match them to the skill level required for safe completion of tasks. They found that accurate parental assessment of developmental abilities was positively correlated with safety knowledge ($r=0.237$, $p=<.05$) and parental education level ($r=0.184$, $p=<.05$) but was not significantly correlated with the age of the parent or number of children in the family. A negative, but not significant, correlation was found between safety knowledge and accurate assessment of developmental ability and being injured in the preceding months. Sandels (1970) examined whether parents under- or overestimated their children's developmental skills and found that parents expected their children to have skills that exceeded those normal for their ages. This can have a significant impact on agricultural operations, where tasks are inherently more hazardous than those typically performed by children; thus, accurate assessment of developmental appropriateness may be more critical.

The effectiveness of United States legislation for preventing childhood agricultural injury has been questioned (Rivara, 1985; Bean, 2003), and setting additional limits on agricultural exposures have been suggested by several sources (AAP, 2001; Gerberich et al., 2001; Lee et al., 2001; Lee and Marlenga, 1999; Pickett et al., 2005; Stueland et. al, 1991). Currently, the NAGCAT guidelines (Lee and Marlenga, 1999) regarding the developmental appropriateness of work assignments for children aged 7 to 16 years old are the only limits suggested for agricultural exposures. Research on the association between children's work practices and the risk of agricultural injury and on the potential "preventive" efficacy of existing or proposed labor and/or safety guidelines has not yet been undertaken. However, this research is necessary to further reduce the burden of childhood agricultural injury.

The Social Environment

The assignment of hazardous agricultural work to children is thought to be influenced by at least two sets of social factors. The first are agrarian values and/or social norms; agricultural communities have historically valued exposing children to challenges in order for them to develop skills, develop a strong work ethic, provide time to be together, and strengthen family bonds (Kelsey, 1994). As an example of a potential mechanism of injury, Debarr et al. (1998), found that the best predictor of youths' intentions to operate tractors safely was the subjective norm or their perceptions of what friends and family members wanted them to do.

The second set of factors is economic in nature; children may perform more chores for longer periods of time and be more exposed to agricultural hazards when the family is under economic stress, in order to meet productivity requirements, to make productivity gains (Elkind, 1993; Kidd et al., 1997; Pryor et al., 2002), or, possibly, because parents are unable to find alternative child care or locate/pay hired workers (Tevis, 1997). Economic pressures may delay the replacement/retrofitting of older equipment that may break down more frequently or lack safety devices; this may lead to off-operation employment and/or extended work hours for heads of households or may result in children performing more chores at younger ages, being less supervised, or being cared for in the agricultural work environment since rural daycare is not easily accessible or affordable (Purshwitz et al., 1990). Elkind (2002) emphasized that political, economic, and cultural "structures" affect the organization of work and labor on the operation by creating the stresses upon which unsafe decisions are made.

The social and economic structural forces that influence the assignment of work practices and the perception of risk associated with agricultural hazards are seldom acknowledged by agricultural injury researchers, and their association with agricultural injury has not been assessed. Understanding the social determinants of agricultural injury and the pathways through which they work is important. The costs and benefits of children's agricultural work should only be evaluated from a systems perspective because risk perceptions are socio-culturally defined and, if economic or political gain is associated with risk, the risk is often tolerated (Elkind, 2002), even if it is risk incurred by young children. For example, the food cost per capita (relative to Gross National Product) in the United States is currently the lowest in the world (Donham and Storm, 2002). The availability of inexpensive agricultural products is clearly a benefit to society, but the "net benefit" of the current agricultural production practices and policies cannot be adequately evaluated unless their total "costs" are understood in terms of both individuals and agro-economics. Such a comprehensive assessment would best direct the appropriate level of intervention. If hazardous agricultural exposures are primarily associated with lack of information or unsafe beliefs, they are best addressed by individual- and community-level interventions; however, if exposures are primarily associated with economic pressures, then "only interventions that result in basic changes at the industry or government regulation level will truly be effective" (Arcury and Quandt, 1998).

Limitations of Previous Research

Childhood agricultural injuries are a significant and preventable public health problem. Agricultural research has been limited by a number of factors. First, childhood agricultural injuries and children's agricultural work hours are not reportable; efficient methods for collecting data on the number of children incurring injuries or the number of children engaged in agricultural work or exposed to it as bystanders do not exist. Agricultural injury research has primarily been descriptive in nature and based on small sample sizes or on large administrative databases lacking valid denominators (Reed and Claunch, 2000; Stallones and Gunderson, 1994). Two recent reviews of agricultural safety interventions found few published papers evaluating the effectiveness of childhood agricultural injury-prevention interventions (DeRoo and Rautiainen, 2000; Hartling et al., 2004;). DeRoo and Rautianinen (2000) assessed evaluations of 25 interventions published, between 1982 and 1999, and found that most had an inadequate study design, nine lacked an evaluation component, and the impact on the incidence of agricultural injury was infrequently examined; the three studies in which injury incidence was an outcome did not include children. Hartling et al. (2004) assessed evaluations of 23 interventions published between 1980-2002. Of the 23, only nine involved controlled trials, only eight were published in peer-reviewed journals, all evaluated educational interventions, and intermediate outcomes such as "knowledge acquisition" or changes in attitudes/behavior were primarily assessed.

Second, many parameters are used inconsistently in childhood agricultural injury research, including the age range of the study population, the type and/or severity of injury ascertained, whether or not off-operation transportation injuries are included, and the extent to which the incurred injury is related to the performance of agricultural tasks. Collecting information on the circumstances at the time of injury or immediately preceding it, especially circumstances related to performing work, recreational activities, by-standing, and/or playing, is extremely difficult.

Third, the duration of children's exposures to specific hazards or to factors that reduce their hazardousness (personal protective equipment, modification of equipment, supervision, etc.) has not been quantified. For example, tractors are identified as responsible for more than 60% of agricultural fatalities and 26% of the agricultural injuries among children, 0 to 19 years of age (Rivara, 1985); however, while tractors are also the most common piece of agricultural machinery, data on children's exposure to them are frequently lacking, thus, limiting evaluation of risk. Another example is the disproportionate numbers of injuries incurred by children who have agricultural jobs, compared to those working in all other industries. Although the hours of agricultural work and types of exposures were not identified, children who had agricultural jobs in 1980 were reported to have worked twice as many hours as children who had non-agricultural jobs (Greenberger and Steinberg, 1986); yet, the comparative risk could not be evaluated.

Finally, the causal mechanisms of injury are infrequently specified, assessed, or evaluated. Pertinent to the current effort, neither supervision of agricultural tasks nor its underlying determinants are understood or adequately measured. Morrongiello's (2005) suggestions for future directions for supervision research, in general, are equally applicable to better understanding supervision in the agricultural context: measure the "exposure rate," examine longitudinal patterns and how supervision interacts with children's development or injuries, examine differences in supervision by gender or by adult/sibling status, and investigate how supervision is used in combination with other strategies for managing injury risk.

Given the limited research, further evaluation of how parental safety beliefs and choices about children's work practices influence the risk of childhood agricultural injury is clearly needed. The current study provides the unique opportunity to conduct a preliminary investigation of these factors, utilizing a comprehensive regional surveillance database. The findings of this study will be an important step in understanding mechanisms of agricultural injury to children and in the development of effective intervention strategies.

Abbreviations

AAP – American Academy of Pediatrics
BLS – Bureau of Labor Statistics, U.S. Department of Labor
CDCP – Centers for Disease Control and Prevention
FLSA – Fair Labor Standards Act of 1938
OSHA – Occupational Safety and Health Act of 1970
NAGCAT – North American Guidelines for Children's Agricultural Task
NASS – National Agricultural Statistics Service
NCHS – National Center for Health Statistics
NEISS – National Electronic Injury Surveillance System
NSC - National Safety Council
ROPS – roll-over protective structure

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CHAPTER III

RESEARCH DESIGN AND METHODS

Overview

This study was based on data collected in the Regional Rural Injury Study-II (RRIS-II). The RRIS-II was conducted in two phases, Phase 1 in 1999 and Phase 2 in 2001, for each respective six-month period, and was designed to identify the incidence and consequences of, and risk factors for childhood agricultural injuries (Gerberich et al., 2004). The RRIS-II incorporated a nested case-control design within a population-based surveillance effort of injuries incurred by agricultural operation households in Minnesota, Wisconsin, North Dakota, South Dakota and Nebraska; this effort is described in detail elsewhere (Gerberich et al., 2004, 2003, 2001). Copies of the interview instruments and all materials utilized in these studies are available from the University of Minnesota's Regional Injury Prevention Research Center (RIPRC) at http://enhs.umn.edu/riprc/riprc.html.

Characteristics of children, their families, and the agricultural operations were examined for each year of data collection; information on injury events and resulting consequences were collected for each six-month period of the two years of study. Comprehensive exposure data were collected, through the nested case-control study for all persons, less than 20 years of age, to enable determination of risk factors for agricultural injury. The resulting data were found to be comparable between the two study years and, thus, databases were combined for analyses. Approvals were received from the University of Minnesota's Institutional Review Board Committee on the Use of

Human Subjects in Research (IRB), prior to the implementation of the RRIS-II and before the current analysis was undertaken.

Specific Aims

The primary aims of this study were to examine the associations between childhood agricultural injury and (a) parental decisions about children's agricultural work practices and (b) parental safety beliefs. Secondary aims were to identify determinants of childhood agricultural injury and the main exposure variables and to assess whether these variables modified the association between childhood agricultural injury and the exposures.

Study Population

<u>Study Cohort</u>

Random samples of 16,000 agricultural operations (3,200 from each state) were generated from the U.S. Department of Agriculture's National Agricultural Statistics Service (USDA-NASS) MasterList Frame of agricultural operations in 1999 and, again, for 2001. Operations were eligible to participate in the RRIS-II studies if they met the following criteria as of January 1: were actively farming/ranching; had a household associated with the agricultural operation; included children younger than 20 years of age (<20); and produced at least $1,000 of agricultural goods in the previous year or were involved in a Conservation Reserve Program (CRP).

<u>Cases and Controls</u>

All RRIS-II participants younger than 20 years of age (< 20) were included in the current study; 425 injury events were ascertained: 203 injury events (199 youths/191 households) in 1999, and 222 injury events (212 youths/195 households) in 2001. Controls (n=1886) were identified through random selection at a ratio of ~3.7 controls per case in 1999 (755 controls involving 735 youths and 724 households) and ~5.1 controls per case in 2001 (1,131 controls involving 1,082 youths and 1,050 households), using an algorithm based on expected injury incidence per month. Persons for whom injury events were ascertained were eligible to be chosen as controls for any month prior to the exposure month for the injury event; a person could be selected as a control more than once.

Participation Rates

In 1999 and 2001, 8,288 (52%) and 8,652 (54%) of the 16,000 agricultural operations sampled in each data collection year were, respectively, identified as ineligible, based on the study's participation screening criteria. A total of 4,402 (28%) of the operations was found to be eligible in 1999 and, of these, 3,765 (86%) participated in the full study. In 2001, 4,408 (28%) operations were found to be eligible and 3,655 (83%) participated in the full study. Overall, the known refusal rate decreased from 25% in 1999 to 19% in 2001.

Data Collection

This nested case-control study utilized injury and exposure data collected in the RRIS-II, a population-based surveillance study, using methods based on previous injury surveillance efforts (Gerberich et al., 1993; 1991). Computer-assisted telephone interviews were conducted for each six-month period of the two data collection years to enhance recall of farming/ranching exposures and injury status (Braun et al., 1994;

Gerberich et al., 1990). Cases were surveyed about their exposures for the months prior to the occurrence of injury; controls were surveyed about their exposures for a random one-month period within the study period. The interviews identified: (a) household demographics (birth date, gender, race, education, etc.) and injury events using the *Household Log*; (b) characteristics of the injury event (source of injury, activity involved, and consequences) using the *Injury Log*; and (c) exposure information related to the month prior to the injury event, for cases, or for the month randomly assigned for controls, using the *Exposure Log*. Non-respondents for whom eligibility status had not been established were sent a cover letter, one-page survey, and postage-paid return envelope to ascertain household eligibility.

Data Analysis and Interpretation

Conceptual Model

A conceptual model (Figure 1) was developed to serve as the basis for more specific causal modeling and to guide the interpretation of results. The model does not include all determinants of agricultural injury (e.g., weather conditions, indicators of task hazardousness, task-related supervision, safety norms, social support, agricultural training, children's physical health or health-related behaviors, or child- or parent-related risk and/or safety knowledge, attitudes/beliefs, intentions, and practices). However, it does include relevant child- and family-level factors that are hypothesized to work in combination to increase (or decrease) the risk of childhood agricultural injury.

Measurement Model

The measurement model developed for this study specified how the outcome, exposure, and covariates in the conceptual model were operationalized. The RRIS-II survey items related to injury, task performance, parental perceptions, and child/family demographics, were, in part, based on the items originally used in the RRIS-I instruments in 1990. These instruments were further refined by the RRIS-II research team after the analysis of a 1997 pilot study using the 1990 data collection instruments and methods in a random sample of 1,200 agricultural households.

Scale Development

New to the RRIS-II data collection instruments were several theoretically-based sub-scales pertinent to child behavior and parent perceptions. Items were drawn from the The Parent Observation of Child Adaptation or POCA instrument (Kellam et al., 1975; Ialongo, Kellam, & Poduska, 1999, in consultation with Kellam and Poduska) and a small additional pool of items were developed from items commonly included in instruments assessing child behavior or parenting, although items in some cases were adapted to the family agricultural context (Achenbach & Edelbroch, 1991; Hetherington & Clingempeel, 1992; Kamphaus & Reynolds, 1998; Masten et al., 1999; Tellegen, 1982). The items used in the survey tools do not reflect imbedded scales because standard scales and instruments have too many items to include. Psychometric analyses of the set of child behavior and parent perception items were performed first on the 1999 respondents and, then, on the combined 1999 and 2001 respondents, using factor analyses with maximum likelihood factor extraction and oblique rotation (Kline, 1998) and inter-item reliability analyses (Cronbach, 1951). Results suggested that there were four dimensions assessed by the child behavior and parenting items: 1) children's self-control; 2) parental monitoring; 3) parental beliefs about the importance of children's physical readiness to undertake a new chore on the agricultural operation (beliefs that age and size are important); and 4) parental beliefs about the importance of children's cognitive readiness to undertake a new chore on the agricultural operation (beliefs that maturity and skills are important). To be consistent with data collection methods, factor analyses examining children's "self-control" were only performed with respondents who were older than five years of age.

The factor groupings and associated survey items are specified in Table 1 and are described in the narrative below. An item was said to load on a given factor if the factor loading was 0.40 or greater and was less than 0.40 for the other factors in the rotated factor pattern matrix. Two self-control items, "distracted" and "broke rules," were seen in the factor analyses results of the 1999 dataset but were not seen in the initial results when the combined 1999 and 2001 datasets were analyzed. Their inclusion increased the internal consistency of the "self-control" factor in the combined dataset analyses, and they were included in the self-control construct used in this study. Factor correlations for the four-factor oblique solution showed moderate correlation for the "cognitive readiness" factor with all other factors (Table 2). The factor correlations supported the use of oblique rotation but are low enough to demonstrate discriminant validity, indicating that the factors do not overlap conceptually.

Outcome Variable Measurement

Childhood agricultural injuries were measured by asking about all fatal or non-fatal injury events that were related to the families' agricultural operations and resulted in one or more of the following: restriction from normal activities for four hours or more; loss of consciousness, loss of awareness, or amnesia for any length of time; and use of professional health care. Injuries could also result from activities such as transportation on roadways, raising animals for recreation or home use, or standing and/or playing on the premises of the operation. Narrative information about the source, mechanism, and outcomes of the injury event was coded by the RRIS-II research team using a simplified coding structure that had also been utilized in previous surveillance efforts (Carr et al., 1992; Gerberich et al., 1993, 1991) and the International Classification of Diseases - Ninth Revision, External Cause Codes (ICD-9-CM 800-999).

Exposure Variable Measurement

The exposure variables of primary interest to this study were parents' decisions about their children's agricultural work and parents' safety beliefs. The parental work decision variables follow below.

Performing work – A nominal variable (yes/no) based on parents' response to the question, "During the [prior month] did [your child] work in any type of activities or do chores related to your operation?"

Number of chores – The number of types of agricultural tasks that had been performed by at least 10% of the respondents in the previous month that had an associated age guideline; responses ranged from 0 to 18. The chores included working with beef cattle (bulls, calving, feeding), dairy cattle (cleaning, feeding, herding), swine, horses, and poultry; operating vehicles (car, truck, motor cycle, ATV, snow mobile, tractor, other large equipment); using hand and/or power tools; working in a storage structure; or working with agricultural chemicals. Being a motor vehicle passenger or tractor passenger was not included.

Average hours worked per week – The hours per week the child worked on their agricultural operation were categorized to reflect patterns of part-time (1-10, 11-30, 31-40), full-time (41-60), and over-time (more than 60).

Developmentally inappropriate work ("working early") – " Earliness" was defined as a child not being sufficiently mature to perform assigned tasks with intermittent supervision and was based on the averaged "developmental appropriateness" of the tasks that had been summed to create the "number of chores" score. The ages used as indicators of "developmental appropriateness" for the tasks were most commonly based on the *North American Guidelines for Children's Agricultural Tasks* (NAGCAT) (Lee and Marlenga, 1999) or the *Hazardous Occupations Order for Agriculture* (HOOA) (USDOL, 1984). The NAGCAT guidelines are voluntary standards developed to help parents assess when and under what supervisory conditions children seven-16 years of age are developmentally ready to perform 62 different agricultural tasks. The NAGCAT age recommendations for task performance with intermittent supervision were used to calculate "earliness" for tasks related to animals, all-terrain vehicles (ATVs), tractors, large equipment operation, and storage structures (Lee and Marlenga, 1999). The minimum age for calving, working with bulls, small power tools, and handling chemicals was set at 16 years old, based on the inclusion of these tasks in the HOOA; HOOA tasks are prohibited for children younger than 18 years of age, unless they are performed by children working on their family operation (USDOL, 1984). The minimum age for operating a motor vehicle was set at 15 years old, based on state motor vehicle licensing requirements.

The difference between the recommended and actual age of performance was used as an indicator of the gap between a task's developmental demands and a child's developmental readiness to perform the task (i.e., their stature, motor development, cognitive development, behavioral characteristics). A risk score was generated for each task performed (Table 3), a total score reflective of injury risk was generated by summing the scores for the individual tasks, and the summed scores were divided by the number of chores actually performed. The averaged early scores were grouped to reflect similar patterns of risk and modeled as a categorical variable (child is not working, working and is the recommended age or older, working and is younger than the age recommendation by 2 years, > 2 to ≤ 3 years, > 3 to ≤ 4 years, > 4 to ≤ 6 years, and > 6 years).

The parental safety belief variables follow below.

Monitoring – To assess how strictly children were monitored, parents were asked, "During the past month, how strict were you about...: a) knowing where your child was, and b) knowing who your child was with." Responses used a four-point Likert scale (1=*not strict,* 2=*somewhat strict,* 3=*moderately strict,* 4 = *very strict*); the items were summed to obtain a total score and divided by the number of non-missing responses.

Higher scores reflected stricter monitoring practices. Chronbach's alpha = 0.84, based on the average inter-item correlation, indicated high internal reliability for the monitoring construct.

Importance of task readiness – Four items measured parental beliefs about the importance of developmental characteristics when deciding whether their child was ready to do a new chore on the farm or ranch: (a) beliefs about children's age and size were combined into a proxy measure of the "importance of physical readiness", (alpha = 0.63); and b) beliefs about children's maturity and skills were combined into a proxy measure of the "importance of cognitive readiness" (alpha = 0.59). Responses used a four-point Likert scale (1=*not important,* 2=*somewhat important,* 3=*moderately important,* 4 = *very important*); the items were summed to obtain a total score and divided by the number of non-missing responses. Higher scores reflected a more conservative attitude about when a child was ready to perform a new task.

<u>Covariate Measurement</u>

It was hypothesized that the child- and parent-related variables influenced the exposures of primary interest (parents' decisions about children's work practices and parents' safety beliefs) and that safety beliefs also influenced children's work practices.

The parent-related variables in the conceptual model were the parents' averaged ages, the highest level of maternal education (less than high school, high school graduate, technical school [some and graduate], and college [some, graduate, and post-graduate]), and the hours worked per week on the agricultural operation. The hours worked variable was the averaged hours worked by the respondent head of household and the respondent's spouse/partner (a co-head of household) if both were present. If only one head of household was present, then, the hours worked were the number of hours that they reported.

The child-related variables measured were age, gender, self-control, size-for-age, prior injury experience, and year of participation, described below.

Self-control – Attention and behavioral characteristics that potentially influence task performance were measured for all children over five years of age. Parents indicated how frequently a set of behavioral questions applied to their children using a four-point Likert scale (1=*almost never,* 2=*sometimes,* 3=*often,* 4 = *almost always*). "Self-control" represents the summed responses of eight items divided by the number of non-missing responses: "pays attention, concentrates, is cautious, is [not] easily distracted, works hard, [doesn't] break rules, [isn't] impulsive, [doesn't] act without thinking" (alpha = 0.79).

Child size-for-age – Percentile values for length-for-age (height) and body-mass index (BMI) were generated, comparing each child against national growth charts, based on measurement data collected by the *National Health and Nutrition Examination Survey* (NHANES) for children of the same age and gender (NCHS, 2000). The height percentiles were grouped into "short" ($\leq 5^{th}$) and "not short" ($> 5^{th}$ to 100); BMI percentiles were grouped into "underweight" ($\leq 5^{th}$), "normal" ($> 5^{th}$ to 85^{th}), "at risk of overweight" ($> 85^{th}$ to 95^{th}), and overweight ($> 95^{th}$ to 100) (CDCP, 2005).

Prior injury experience variables distinguished between the number of prior agricultural injuries that were incurred by the child and the number of prior agricultural injuries that were incurred by the remaining household members, not including the child.

Year of participation – A variable was created to indicate year of participation to control for potential confounding from factors associated the 29% decrease in the number of injuries to youth living on United States farms and a significant decline in the rate of agricultural injuries to household males between 1998 and 2001 (Hendricks et al., 2004). Additionally, even though in the current study, the frequencies of characteristics relating to children, families, and agricultural operations were comparable across data collection periods, differences were noted for frequencies of the monitoring and work practice measures, and the risk of injury decreased by 20% for respondents participating in 2001 compared to 1999, (OR = 0.8, 95% CI = 0.6 to 0.9), despite adjustment for the child's age, gender, and work hours.

Analytic Approach

The primary aim of this study was to examine the associations between childhood agricultural injury and (a) parental decisions about children's agricultural work practices and (b) parental safety beliefs. Secondary aims were to identify predictors of childhood agricultural injury and the main exposure variables and to assess whether these variables modified the exposure-injury association. These aims were accomplished by using multivariate logistic and linear regression methods. The hypotheses and statistical methods associated with each aim are described below.

Aims and Hypotheses

Aim 1: Assess if childhood agricultural injury is associated with parental decisions about children's work practices and parental safety beliefs. Hypotheses (H)1:1-7: Individuals who have the following exposures, compared with those who do not, will have an increased risk of agricultural injury:

Parental decisions about children's work practices:

H1.1. Performing agricultural work (versus not performing agricultural work)

H1.2. Performing an increased *number of chores* (versus performing fewer chores)

H1.3. Performing more *hours per week* of agricultural work (versus fewer hours)

H1.4. Performing agricultural work before the child is developmentally ready, *"early"*

Parental safety beliefs:

H1.5. Decreased *monitoring*

H1.6. Decreased *importance of a child's age/size* in task readiness decisions

H1.7. Decreased *importance of a child's maturity/skill* in task readiness decisions

The following covariates were included in the multivariable models used to assess Hypotheses 1:1-7: Parent: age, maternal education, children in household, hours per week head of household worked. Child: age, gender, self-control, height-for-age, BMI-for-age. Prior injury experience: prior child injury, prior household member injury.

Aim 2: Identify determinants of childhood agricultural injury, parental work decisions, and safety beliefs. Hypotheses (H)2:1-11: The following variables are associated with childhood agricultural injury, parental work decisions, and parental safety beliefs:

Parent and household characteristics:

H2.1. *Parent age* – Having younger parents is associated with an increased risk of agricultural injury, unsafe work practices, and reduced safety beliefs. Model covariates included maternal education level, number of children in household, average hours/week head of household worked.

H2.2. *Maternal education* – Higher levels of maternal education are associated with decreased risk of agricultural injury and increased safety beliefs and are inconsistently associated with work practice levels. Model covariates included: parent age, number of children in household, average hours/week head of household worked.

H2.3. *Number of children in household* – Larger families are associated with an increased risk of agricultural injury, unsafe work practices, and reduced safety beliefs. Children are less likely to receive parental attention and more likely to be supervised by siblings. Parenting experience may be protective if raising older siblings had improved parents' accuracy in estimating the risk inherent in a task or a child's developmental abilities to perform it but could also be a risk factor if a family had not experienced consequences of unsafe work practices. Model covariates included parent age, maternal education level, average hours/week head of household worked.

H2.4. *Hours per week parents work* – Parents' hours of work per week is associated with an increased risk of agricultural injury, unsafe work practices, and decreased monitoring because children whose parents work off the farm or whose parents work excessive hours on the farm may be asked to perform more work or work that is not developmentally appropriate or adequately supervised. The variable was calculated as the averaged hours per week of work on the agricultural operation reported for both head of households; if there was only one head of household the hours per week of agricultural work were not averaged. Model covariates included parent age, maternal education level, number of children in household.

H2.5. *Prior injury-other household members:* Prior injuries to other household members are associated with an increased risk of agricultural injury, unsafe work practices, and reduced safety beliefs. Model covariates included parent age, maternal education, number of children in household, average hours/week head of household worked, child age, child gender, self-control, height-for-age, body mass-index-for-age.

Child characteristics:

H2.6. *Child age* – Being older is associated with an increased risk of agricultural injury, unsafe work practices, and reduced safety beliefs. Model covariates included parent age, maternal education level, number of children in household, average hours/week head of household worked.

H2.7. *Child gender* – Being male is associated with an increased risk of agricultural injury, unsafe work practices, and reduced safety beliefs. Model covariates included child's age.

H2.8. *Self-control* – Answers of "almost never" and "almost always" exhibiting self-control are associated with an increased risk of agricultural injury; "almost always" exhibiting self-control is associated with unsafe work practices and reduced safety beliefs. Model covariates included child age, child gender, parent age, maternal education level, number of children in household, average hours/week head of household worked.

H2.9. *Height-for-age* – Being short is associated with an increased risk of agricultural injury, safer work practices, and increased safety beliefs. Model covariates included parent age, maternal education level, number of children in household, average hours/week head of household worked.

H2.10. *Body mass-index-for-age (BMI)* – Being in a low or high BMI percentile is associated with an increased risk of agricultural injury; being in the high BMI percentile is associated with unsafe work practices and reduced safety beliefs. Model covariates included parent age, maternal education level, number of children in household, average hours/week head of household worked.

H2.11. *Prior injury-child* – Prior injuries to the child is associated with an increased risk of agricultural injury, unsafe work practices, and reduced safety beliefs. Model covariates included parent age, maternal education, number of children in household, average hours/week head of household worked, child age, child gender, self-control, height-for-age, body mass-index-for-age.

Aim 3: Using the statistical models described above, assess whether the child- and parent-related covariates modify the association between childhood agricultural injury and the exposures, parental work decisions and safety beliefs.

Data Analysis

An *a priori* conceptual model was developed for the current effort to identify relationships between relevant variables and to guide the interpretation of results (Figure

1). The analytic approach was further focused by developing directed acyclic graphs (DAGs) for all study hypotheses to identify sufficient sets of covariates to include as deconfounders in the multivariable regression analyses specific to each exposure of interest (Greenland et al., 1999). The sufficient sets of covariates were included in the multivariate analyses to (a) control for potential confounding, (b) improve the precision of comparisons between the main effect variables by reducing systematic variation associated with the covariates, and (c) more closely approximate a "real world" versus "experimental and/or controlled" setting (Ramsey and Schafer, 2002). Table 4 presents the covariate selection strategy for deconfounders included in the safety beliefs and work practices multivariable regression models.

Univariate analyses were performed to examine the correspondence between the distribution of the data and the distributional assumptions of the statistical methods utilized in the analyses and to describe the characteristics of individual exposures. Non-linear relationships were represented as categorical variables and were coded so that missing data were indicated by a separate category. Continuous variables, for which data were missing for more than five observations, were re-parameterized: all observations with missing responses were recoded as “0” and a separate variable was created to identify whether the original variable had data missing (0=data not missing, 1=data missing).

Logistic regression (Breslow and Day, 1980) was used to model the probability of a childhood agricultural injury (I) as a logistic function of exposures (parental work practice decisions and parental safety beliefs) (x) and a vector of confounding factors (z)

$$P(I|x, \underline{z}) = \frac{\exp(\alpha + \beta x + \gamma \underline{z})}{1 + \exp(\alpha + \beta x + \gamma \underline{z})}$$

where α, β, and γ were model coefficients estimated from the data. The odds ratio for the effect of a variable x was equal to exp(β). With the control-sampling scheme employed for this study, the odds ratio estimates the incidence density (hazard) ratio and is interpreted as the change in the odds of obtaining I for every one-unit increase in x, adjusted for potential confounders, missing values, non-response, and unknown eligibility biases.

Linear regression (Kleinbaum et al., 1988) was used to estimate the association between potential determinants and the likelihood of parental work practice decisions and safety beliefs (the original exposures of interest), adjusted for potential confounders, year of participation, missing values, and non-response and unknown eligibility biases. A case-control indicator variable was also included as a covariate in the linear regression models to avoid bias from the potential association of the work practices and safety beliefs (modeled as dependent variables in the linear regression models) and childhood agricultural injury, given the proposed covariate.

Valid estimation of effects using regression analyses requires that three major assumptions be satisfied (Maldonado, 1993): (a) all important confounders are included in the model; (b) the structural model correctly specifies the mathematical relation between childhood agricultural injury, the exposures of interest, and covariates; and (c) the sampling model correctly specifies the random variation in the data.

To ensure all important confounders were included in the model, two confounder selection strategies were employed by this study: (a) graphical criteria were used to identify confounders and to determine a sufficient set for confounding adjustment (Greenland et al., 1999; Pearl, 2000) (sufficient sets are identified in the *Aims and Hypotheses* section); and (b) child's age and gender were forced into most statistical models even if they were not identified as a confounder using graphical criteria because they were consistently associated with work practices, supervision, developmental beliefs, or agricultural injury in the literature and they were not intermediate in the causal path from exposure to outcome or a consequence of the outcome. Failure to control for an important confounder results in bias, while control of nonconfounders can also bias results and may decrease the precision of estimates. Selection of confounding variables is difficult because a variable's status as a confounder depends on relationships in the population being studied, which are rarely known with certainty (Robins and Greenland, 1986).

To ensure that the structural model correctly specified the mathematical relation between childhood agricultural injury, the exposures of interest, and covariates, the model form must be either correctly specified (if the model form makes strong restrictions on the relation between the variables) or it must be flexible enough to accommodate a wide range of relationships among the variables. The data, rather than the exponential dose-response relationship implied by a simple logistic regression statistical model, were allowed to determine the shape of the exposure-disease relationship. Continuous exposure variables were redefined as categorical variables:

dummy variables were created for each categorical value, entered into the logistic regression model, and their effect was estimated and assessed for linearity. Exposure-covariate product terms were entered into the model to relax the multiplicativity assumptions of a simple logistic model. Departures from additivity (interaction) were evaluated by estimating the relative effects of the product terms. The details of these model-building procedures are discussed in Rothman and Greenland (1998).

Bias Evaluation

The study's potential biases were minimized through adherence to aggressive quality control procedures to diminish measurement and reporting errors. Potential biases were additionally assessed through the calculation of the psycho-metric properties of the child development measures and sensitivity analyses evaluating the impact of potential measurement error and confounding biases on the study results (Drews and Geenland, 1990; Greenland and Kleinbaum, 1983).

Information Bias

Measurement error can result in a large amount of bias and can seriously threaten the validity of epidemiologic study results. Recall bias from the self-reporting of exposures was minimized by using a time period of one month as the exposure period of interest and collecting surveillance data every six months over the two twelve-month study periods. This approach has been found to be successful in previous efforts (Braun et al., 1994; Gabel et al., 2000; Gerberich et al., 1990).

This project addressed the potential for measurement error in that the classification of "earliness" used the minimum age levels that were recommended by the

NAGCAT guidelines for intermittent supervision, which were generally two years older, or more conservative, than the absolute minimum age levels recommended for each task requiring constant supervision. Further, sensitivity analyses were conducted for (a) the 1,444 respondents who reported performing any agricultural work; defining sensitivity as the probability that tasks were correctly classified as "developmentally appropriate" and specificity as the probability that children whose tasks were not developmentally appropriate were classified as unexposed; and (b) the 2,197 respondents for whom monitoring data were collected, defining sensitivity as the probability that parents "very strictly" monitored their children and specificity as the probability that parents who monitored their children less than very strictly were classified as unexposed.

While it is not possible to "correct" risk estimates for bias due to measurement error (Greenland and Kleinbaum, 1983), the range of potential risk estimates generated by adjusting for varying levels of sensitivity and specificity among cases and controls for different plausible scenarios of information bias suggests bounds around the correct estimate.

Selection Bias

Selection bias occurs when the cases/controls in the study are a biased sample of the possible cases/non-cases in the study population during the study period. Non-response bias, a form of selection bias, was controlled by inversely weighting responses by estimated probabilities of response (Horvitz and Thompson, 1952), estimated as a function of household characteristics (state of operation, type of operation, annual revenue by quintiles) from the U.S. Department of Agriculture's National Agricultural

Statistics Service database. The unknown eligibility among non-respondents was controlled by down-weighting each sample member by the estimated probability of ineligibility among the respondents with the same characteristics (Mongin, 2001).

Confounding

Sensitivity analyses were conducted to assess the magnitude and direction of potential bias from the omission of an unmeasured confounder that increased the odds of childhood agricultural injury by factors of 5, 10, and 20. Using methods described by Rothman and Greenland (1998), analyses were conducted to generate a range of estimates for the odds of injury, adjusted for the prevalence of the unmeasured confounder such as (a) level of task supervision among children who performed developmentally appropriate work versus those whose work was not developmentally appropriate and (b) task hazardousness among children whose parents who reported being very strict about monitoring versus those who were not strict.

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Table 1. Exploratory Factor Analysis Results: Pattern Matrix

Extraction Method: Maximum Likelihood.
Oblique Rotation Method: Promax with Kaiser Normalization. Rotation converged in 4 iterations

RRIS-II Survey Items	Factors: Self-control	Factors: Monitoring	Factors: Task Readiness – Physical	Factors: Task Readiness – Cognitive	alpha	Number Missing
Concentrates[P]	.680	.030	.003	-.034		
Pay attention[P]	.666	.017	-.025	.072		
Easily distracted[P,BASC]	-.610	.013	-.005	.043		
Is cautious[P]	.589	.028	.030	.068		
Works hard[P]	.524	-.054	-.023	.026	.791	57
Broke rules[P]	-.496	.022	.018	.031		
Impulsive[CBCL, BASC]	-.486	.018	-.035	.038		
Acts without thinking[CBCL, BASC]	-.476	.001	.026	.015		
Monitor – where[MPQ]	.010	1.004	-.012	-.021	.837	202
Monitor – who[MPQ]	-.033	.721	.002	.035		
Age important	.019	.014	1.008	-.065	.628	45
Size important	-.046	-.036	.427	.187		
Maturity important	-.009	.029	.042	.644	.587	46
Skills important	.005	-.010	.026	.630		

Origin of the items:
P: adapted from the Parent Observation Instrument (Kellam et al., 1975).
CBCL: adapted from the Child Behavior Checklist (Achenbach and Edelbroch, 1991).
BASC: adapted from the BASC Monitor for ADHD (Kamphaus and Reynolds, 1998).
MPQ: adapted from the Multidimensional Personality Questionnaire (Tellegen, 1982).
No indicator: developed by RRIS-II research team based on literature review and use in previous research.

Table 2. Exploratory Factor Analysis Results: Factor Correlation Matrix

Factor	1 – Self-control	2 - Monitoring	3 - Physical	4 - Cognitive
1– Self-control	1.000	.011	.069	.146
2– Monitoring	.011	1.000	.089	.207
3– Physical	.069	.089	1.000	.187
4– Cognitive	.146	.207	.187	1.000

Extraction Method: Maximum Likelihood.

Rotation Method: Promax with Kaiser Normalization.

Table 3. Possible "Earliness" Scenarios

Was task performed?	Was task performance "early"?	
	Yes	No
Yes	Task was performed early; value was calculated as the difference between the age recommended by guidelines at intermittent-periodic supervision and the child's age. Earliness risk score = 1-18; a higher score indicates greater risk.	Task was performed; child was the appropriate age (per guideline). Earliness risk score = 0.
No	The task was not performed, but child would have been developmentally "early." Earliness risk score = 0.	The task was not performed. The child met or was older than the minimum age recommended by guidelines. Earliness risk score = 0.

Table 4. Confounder Selection Strategy

I. Exposures of interest: **Children's Work Practices**

- Working versus not working
- Working early
- Hours worked per week
- Number of chores

Outcome of interest: Childhood Agricultural Injury (Injury)

Unblocked backdoor paths to justify the inclusion of variables in a minimum sufficient set to adjust for potential confounding (identified in the Conceptual Model, **Figure 1**).

1) Child Characteristics → Contact with Injury Agent → Injury
2) Prior Injury Experience → Contact with Injury Agent → Injury
3) Parent Characteristics → Contact with Injury Agent → Injury
4) Parental Safety Beliefs → Contact with Injury Agent → Injury

Minimal sufficient set:
Child Characteristics, Prior Injury Experience, Parent Characteristics, Parental Safety Beliefs

II. Exposures of interest: **Parental Safety Beliefs**

- Monitoring
- Task Readiness

Outcome of interest: Childhood Agricultural Injury (Injury)

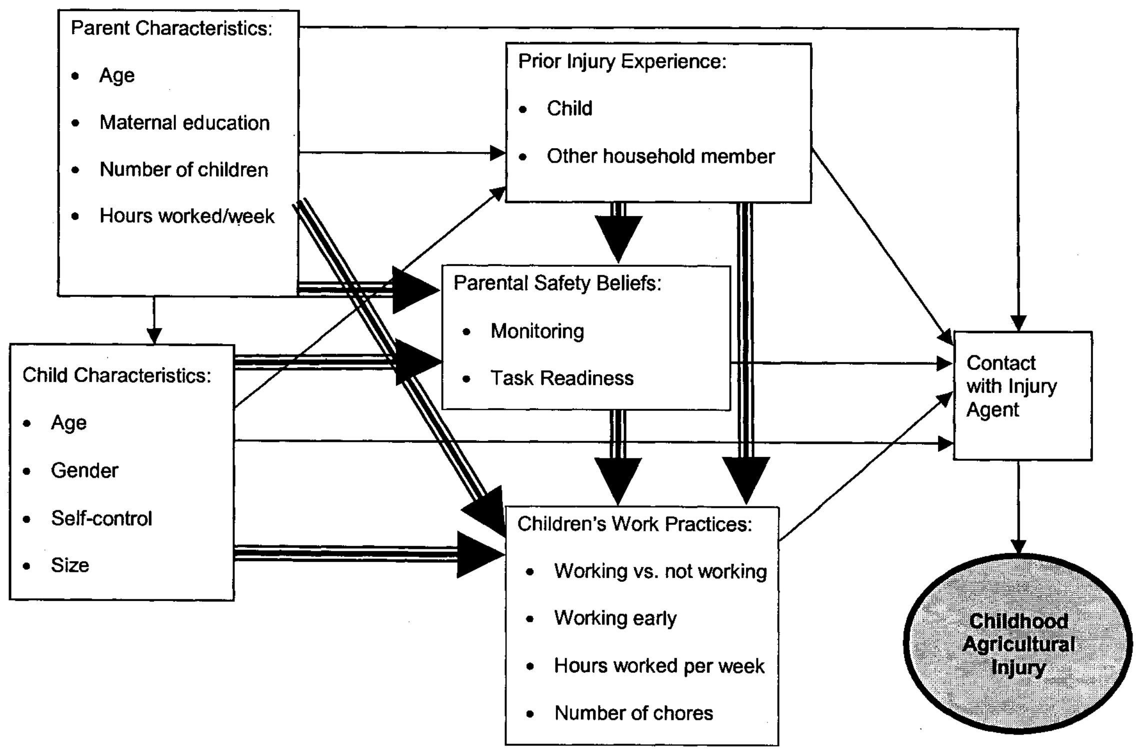
Unblocked backdoor paths to justify the inclusion of variables in a minimum sufficient set to adjust for potential confounding (identified in the Conceptual Model, **Figure 1**).

1 - 3) See descriptions for 1-3 for Children's Work Practices above

Minimal sufficient set:
Child Characteristics, Prior Injury Experience, Parent Characteristics

Figure 1. Conceptual Model – Children's Work Practices and Childhood Agricultural Injury

Thick triple line = Effect of variable at arrow head also modified by the variable at the arrow tail
Note: Year of Participation (1999 or 2001) is included in all statistical models, but is not shown here.



CHAPTER IV

WORK PRACTICES AND CHILDHOOD AGRICULTURAL INJURY

ABSTRACT

Objective: To evaluate whether children's agricultural work practices were associated with childhood agricultural injury and to identify injury and work practice predictors.

Methods: Analyses were based on nested case-control data collected by the Regional Rural Injury Study-II (RRIS-II) surveillance effort in 1999 and 2001 by computer-assisted telephone interviews. Cases (n = 425) and controls (n = 1886) were persons younger than 20 years of age from Midwestern agricultural households. All injury events were selected as cases; controls were selected using incidence density sampling. Multivariate logistic regression was used to estimate the risk of injury for agricultural work, performing chores earlier than developmentally appropriate, hours worked per week, and number of chores performed.

Results: Increased risks of injury were observed for children who: performed any agricultural work (odds ratio [OR] = 3.9, 95% confidence interval [CI] = 2.6-5.6) ; performed 7-10 chores per month compared to one chore (2.2, 1.3-3.5); worked 11-30 or 31-40 hours per week compared to 1-10 hours (1.6, 1.2-2.1 and 2.2, 1.3-3.7, respectively); and performed chores an average of two-three years younger than recommended, compared to being "age-appropriate" (2.6, 1.4-4.5). Decreased risks of injury were observed for non-working children compared to children performing what were commonly considered "safe" levels of agricultural work.

Conclusions: This study is the first to use population-based case-control data to evaluate the risk of childhood agricultural injury associated with performing developmentally inappropriate chores. Results suggest that the efficacy of age restrictions for preventing the occurrence of childhood agricultural injuries warrants further evaluation.

INTRODUCTION

Agricultural families are romanticized as living a simple life, close to nature (Kelsey, 1994). In reality, they are exposed to machinery, livestock, chemicals and zoonoses, and are potentially at higher risk of injuries, reproductive and nervous system damage, and some cancers (Perry, 2003). In 2004, the fatal and disabling injury rates per 100,000 agricultural workers were 29.2 and 5,000, 8.35 and 1.67 times greater, respectively, than the rates for all occupations combined (NSC, 2005-2006). Between 1995 and 2000, children less than 20 years old averaged 116 agricultural fatalities a year (annualized rate: 9.3 per 100,000 youth) (Goldcamp et al., 2004). In 2001, youths visiting, living on, or hired to work on agricultural operations incurred 22,648 injuries (Hendricks et al., 2004).

Children are commonly expected to participate in agricultural-related work. Because family operations are exempt from federal labor and safety standards, parents regulate their children's exposures to agricultural hazards, often assigning tasks beyond their developmental ability (Elkind, 1993; Lee, 1997; Marlenga et al., 2001a; Marlenga et al, 2001b). To help parents assess the developmental readiness of children, aged 7-16, to perform agricultural work, the *North America Guidelines for Children's Agricultural Tasks* (NAGCAT) were developed to provide voluntary age guidelines for 62 common tasks (Lee and Marlenga, 1999).

Agricultural work practice decisions are often "framed within an economic model where the costs of possible injury outcomes are not weighted heavily" (Kidd et al., 1996), thus, contributing to the perception that economic and developmental benefits of childhood agricultural work outweigh its risks (Elkind, 1993; Kelsey, 1994; Pickett, 2003; Zentner et al., 2005). This framework also justifies the exemptions of family operations from the Fair Labor Standards Act (USDOL, 1984) and of operations employing less than 11 workers from the Occupational Safety and Health Act (Kelsey, 1994). To better understand the risk of work practice decisions and to inform injury prevention efforts, the current study evaluated the associations between children's work practices and childhood agricultural injury.

METHODS

Study Design and Subjects

This study was based on nested case-control data collected in the Regional Rural Injury Study-II (RRIS-II) surveillance efforts in 1999 and 2001. The RRIS-II was designed to identify the incidence and consequences of and risk factors for children's agricultural injuries and is described elsewhere (Gerberich et al., 2004, 2002, 2001). RRIS-II materials are available at http://enhs.umn.edu/riprc/riprc.html. Approval was obtained from the University of Minnesota, Institutional Review Board, Human Subjects Committee.

A random sample of 16,000 agricultural operations (3,200 from each participating state: Minnesota, Wisconsin, North Dakota, South Dakota, and Nebraska) was generated from the U.S. Department of Agriculture's National Agricultural Statistics Service (NASS) Master ListFrame of Agricultural Operations for each data collection year. Households were eligible if, as of January 1 (1999/2001), they actively farmed or ranched, included children younger than 20 years of age in residence, and had produced at least $1,000 of agricultural goods in the prior year, or participated in a Conservation Reserve Program (CRP).

Cases (n = 425) and controls (n = 1886) were persons younger than 20 years of age identified from the RRIS-II database. All injury events were selected as cases. Controls were selected using incidence density sampling. Agricultural injuries were defined as events incurred as a result of performing, or being associated with, an activity related to the agricultural operation that resulted in one or more of the following: restriction from normal activities for four hours or more; loss of consciousness or awareness, or amnesia for any length of time; or use of professional health care.

Work practice frequencies differed by year of participation. An indicator was included in all multivariate analyses to adjust for these differences and for factors represented by declines in the rate of agricultural injuries to males younger than 20 years old and number of injuries to all youths living on U.S. operations between 1998 and 2001 (Hendricks et al., 2004).

Data Collection

Computer-assisted telephone interviews were conducted by NASS interviewers for each six-month period of each study year to ascertain injury incidence and relevant consequences. Case exposures were ascertained for the month prior to injury occurrence; control exposures were ascertained for a random one-month period within the study period, based on an algorithm of expected injury occurrence (Gerberich et al., 1993 [RRIS-I, 1990]; Gerberich et al., 2003 [RRIS-II, 1999]).

Measures

Four work practice exposures were evaluated.

Performing work – A dichotomous variable (yes/no) based on parents' response to the question, "During the [prior month] did [your child] work in any type of activities or do chores related to your operation?"

Number of chores – The number of types of agricultural chores children performed in the previous month from a possible 18 chores that were performed by at least 10% of the respondents: working with beef and dairy cattle (calving, feeding, cleaning, herding), swine, horses, and poultry; operating vehicles (tractor, car, truck, motor cycle, ATV, snow mobile, other large equipment); using hand and/or power tools; and working in storage structures or with agricultural chemicals.

Average hours worked per week – The hours per week children worked on their agricultural operations were grouped to reflect patterns of part-time (1-10, 11-30, 31-40), full-time (41-60), and over-time (more than 60).

Working early – Children performing tasks when younger than recommended were designated as working early ("early"). The NAGCAT age recommendations for task performance with intermittent supervision (Lee and Marlenga, 1999) were used as the standard for developmentally appropriate work for tasks associated with animals, all-terrain vehicles (ATVs), tractors, large equipment operation, and storage structures. The minimum age for calving, working with bulls, small power tools, and handling chemicals was set at 16 years of age, based on their inclusion in the *Hazardous Occupations Order for Agriculture* (HOOA) (USDOL, 1984). The minimum age for operating motor vehicles was 15 years of age, based on state motor vehicle licensing requirements.

Differences between the age recommended for task performance and children's actual age were calculated as measures of the developmental gap between each task and children's physical, cognitive, and behavioral maturity. Task-specific risk scores were summed for each child and divided by the number of chores performed. The averaged scores were grouped into seven categories: not working; performing age appropriate work; and working an average of 2 years, > 2 to ≤3 years, > 3 to ≤4 years, > 4 to ≤6 years, or > 6 years younger than recommended.

Parent-related covariates included averaged ages, mothers' highest level of education, number of children in household, and hours per week worked on their agricultural operation. Child-related covariates included age, gender, and:

Self-control – Behavioral characteristics in children older than five years old that potentially influenced task performance. Parents responded to four-point Likert scales, with options of (1) *almost never* through (4) *almost always* to rate whether a child: "paid attention;" "had good concentration;' "was cautious;" "was easily distracted;" "worked hard;" "broke rules;" "was impulsive;" and "acted without thinking." The responses were summed and divided by the number of non-missing items. Chronbach's alpha = 0.78 was calculated for the self-control scale, indicating high internal reliability based on the inter-item correlation.

Size-for-age – Percentile values for height-for-age and body-mass index (BMI) were generated, comparing each child against national measurements of children of the same age and gender (NCHS, 2000). The height percentiles were grouped into "short" (≤ 5^{th}) and "not short" (> 5^{th} to 100); BMI percentiles were grouped into "underweight" (≤ 5^{th}), "normal" (> 5^{th} to 85^{th}), "at risk of overweight" (> 85^{th} to 95^{th}), and overweight (> 95^{th} to 100) (CDCP, 2005).

Prior injuries indicated prior agricultural injuries experienced by the child or by household members, other than the child.

Data Analysis

A causal model based on hypothesized associations between agricultural work practices, relevant covariates, and childhood agricultural injury served as the basis for data analysis (Figure 1). Year of participation was included in all multivariate regression analyses to minimize variance; directed acyclic graphs guided the inclusion of additional covariates (Greenland et al., 1999).

Descriptive statistics were generated for covariates by case-control strata. Odds ratios (ORs) and 95% confidence intervals (95% CI) for the risk of agricultural injury and "performing agricultural work" were calculated with multivariate logistic regression. Interaction terms were constructed for each work practice-covariate pair and tested for significance. Multivariate linear regression evaluated the likelihood of hours worked, performing chores, and working early per unit change in child and parent predictors.

Adjustments for non-response in the presence of unknown eligibility among non-respondents were made by inversely weighting observed responses with probabilities of response (Horvitz and Thompson, 1952), estimated as a function of characteristics available from the NASS Master List-Frame of Agricultural Operations (state, type of operation, and annual revenue by quintile) and adjusted for the estimated probability of eligibility among the sample members with the same characteristics (Mongin, 2001).

Sensitivity analyses examined two issues: (a) the potential efficacy for reducing the risk of childhood agricultural injuries by changing the minimum age recommendations from 16 to 18 years (by re-setting the minimum age of task performance to 18 years old, legal adulthood, for the chores included in the early measure); and (b) potential biases from the omission of confounders of the early-injury association (such as inadequate supervision which increased the odds of injury by factors of 5, 10, and 15), and from misclassification of "early" (due to exposure detection being equivalent for cases and controls or somewhat better for either; Rothman and Greenland, 1998). In the bias assessments, "early" was recoded into a dichotomous variable indicating developmentally appropriate task performance (yes/no) and only working respondents (n=1444) were included in the analyses.

RESULTS

Participant and parent characteristics are presented in Table 1. Cases and controls were most commonly male, aged 16-19 years, of normal weight and height, and "almost always" exhibited self-control; having no prior agricultural injuries was most commonly reported for children and for the other household members. Case parents had more children than did control parents and worked more on their operations.

Children were at increased risk of injury if they performed chores two-three years younger than recommended (Table 2). The "early" category, associated with an increased risk of injury, was primarily comprised of children aged 12-13 (93% of the children working two to three years early). When the minimum age for task performance was re-set to 18 years old, for the sensitivity analysis (see example a, described above), an increased risk of injury was found for children performing chores four to six years early – again primarily children aged 12-13 years old (97%). Increased injury risks were suggestive when chores were performed one to four years younger than recommended, including the "early" category comprised of 16-17 year olds, whose developmental ability had been considered equivalent to adults in the original analysis.

In the original analysis, children had an increased risk of injury if they performed agricultural work at all, worked 11-40 hours per week, or performed 7-10 types of chores per month (Table 2). Significant interactions were observed for: working early and experiencing prior agricultural injuries; number of hours children worked and number of siblings; number of chores children performed and hours parents worked; and performing agricultural work and children's age. The risk of agricultural injury for working, compared to not working, varied by age. The OR and 95% CIs for children aged 0-5, 6-9, 10-11, 12-13, and 14-19 years who worked, compared to those not working were: 1.8, 0.7-4.2; 3.3, 1.3-8.9; 11.2, 2.0-62.9; 4.7, 1.3-16.5; and 6.9, 3.2-15.0, respectively.

When exposure-injury risk estimates were assessed across levels of the modifying covariates, many CIs were unstable due to small numbers. The highest injury risks were seen for children: working two-three years "early" from households incurring one or six or more prior injuries; working 11-40 hours per week from households with three or more siblings ($OR_{11\text{-}30\ hours} = 1.9$, 95% CI = 1.01 -3.4 and $OR_{31\text{-}40\ hours} = 5.3$, 95% CI = 1.9-14.4); and performing three or more chores when parents worked 60 hours or more per week ($OR_{3\text{-}6\ chores} = 3.6$, 95% CI = 0.97 – 12.9 and OR_{7+} chores = 5.1, 95% CI = 1.2 – 22.3.)

When covariate-injury and covariate-work practice associations were examined (Tables 3 and 4), boys had a higher risk of injury and were more likely to work. Children aged 12-13 had a higher risk of injury and were more likely work at all and work early, but worked fewer hours and performed fewer chores, compared to youth 16-19 years old. Children with the least amount of self-control were at higher risk of injury and worked less (at all, fewer hours). Children who sometimes displayed self-control were at decreased risk of injury and worked fewer hours. Children's stature was not associated with injury but was associated with work; short and underweight children worked less (at all, fewer hours) and children at-risk of obesity worked more (at all, more chores).

Prior agricultural injuries increased the risk of being injured and were associated with all work practices. Having siblings increased the risk of being injured and the likelihood of work (at all, early). Children whose parents worked 60 or more hours per week were at higher risk of injury and worked more (at all, more hours and chores). Children whose parents worked less than full-time had a decreased injury risk and also worked less. Having older parents reduced the risk of injury and the likelihood of working early, but increased the likelihood of other work practices (at all, more hours and chores). Maternal education was not associated with injury; children of college-educated mothers were less likely to work (at all, fewer hours and chores) but were more likely to work early.

Results of sensitivity analyses to assess potential biases indicated that developmentally appropriate work retained the same effect direction ($OR_{unadjusted} = 0.71$, 95% CI = 0.55-0.92). Exceptions were when confounder prevalence was much higher among the exposed, or if controls were more likely to recall exposure – correctly or falsely – than cases (OR = 1.18 when case and control sensitivity/specificity were 0.8/0.9 and 0.9/0.8, respectively).

DISCUSSION

This study is one of the first to report increased risk for injury among children performing agricultural tasks at ages younger than recommended. This is consistent with the reduced risk found for NAGCAT dissemination on preventable injuries in a randomized controlled trial (Gadomski et al., 2006) and with descriptive analyses suggesting that age guideline adherence was potentially preventive of injuries (Marlenga et al, 2004; Mason and Earle-Richardson, 2002).

The reduced risk of injury observed for non-working children, compared to working children who met or exceeded age recommendations for tasks performed, suggests that children are safer when not working. Moreover, sensitivity analyses suggest that 16-17 year olds have elevated risk of injury. Taken together, these findings justify further examination of whether current age guidelines are sufficiently conservative. It was also evident that tasks prohibited in the *Hazardous Occupations Order for Agriculture* (HOOA) (USDOL, 1984) were performed by RRIS-II respondents (calving, handling chemicals, working with bulls and small power tools). These tasks were not addressed in the NAGCAT guidelines (Lee and Marlenga, 1999), but they appear to be warranted in future versions.

Associations between child and parent characteristics and injury and work practices were assessed to generate future research hypotheses and to identify potential targets for intervention. Boys and children aged 12-13 had increased risks of injury and were more likely to work. The association between gender and agricultural injury is well-established in the literature (Bancej and Arbuckle, 2000; Dimich-Ward et al., 2004; Hard et al., 1999; NASS, 1999), although it may be partially explained by differential hours worked (Gerberich et al., 2004) or the nature of the assigned tasks. The association between agricultural injury and being 12-13 years old has not been addressed. Potential developmental mechanisms, include the absence of parental behaviors providing support during periods of vulnerability (Masten, in press), parental overestimation of children's abilities, or the inclination of young adolescents to take risks.

Behavior and stature may influence adult perceptions about children's competence and readiness to work. Children described as almost never exhibiting self-control had higher risk of injury and lower risk of working, suggesting a potential behavioral pathway related to injury (via poor self-control) and a possibility that parents respond to some child behaviors by assigning less work. Shortness-for-age and being underweight reduced the likelihood of being injured and performing work (at all and number of chores) but only significantly so for the work practices. Children at-risk of obesity and who often, compared to almost always, exhibited self-control were more likely to be injured and perform more chores, suggesting an injury mechanism involving the assignment of chores, but not necessarily more hours worked.

Having older parents reduced the risk of injury and working early, but increased the likelihood of work. Being older is potentially associated protective parenting attributes, including assignment of developmentally appropriate work. The risk of injury for the number of chores children performed varied by the hours per week parents worked on the operation. Parents working more than 60 hours per week most consistently increased the risk of injury for children performing three or more chores, possibly due to decreased supervision or increased hazardousness of chores assigned to children. The main effect finding that parents' less-than-full-time work was associated with decreased injury risk is potentially explained by children's exposure to agricultural hazards being influenced by off-farm child care options (Pryor et al., 2002) or reduced exposure to agricultural hazards.

The risk of injury for the hours children worked on their operation varied by the number of their siblings. This may be partially explained by the association between parents' and children's work hours. Children who work more may need more supervision, while parents who work more may be more distracted or may assign siblings to monitor younger children. Previous associations between larger families and exposure to hazardous agricultural tasks (Lee et al., 1997) and injury (Schwartz et al., 2005) were linked to inadequate supervision.

Children with prior agricultural injuries had an increased risk of injury and were more likely to work. It is unlikely that prior injuries "cause" increased work; thus, the observed associations potentially reflect the risks incurred by previous work exposures and/or parental reaction to injury. The risk of injury for working early varied by the number of prior injuries among household members other than the child. The highest risks were seen for children working two to three years "early" in households that experienced six or more prior injuries. This is potentially explained by shared economic pressures or hazardous environments, intra-familial risk-taking behaviors, or children assuming hazardous tasks when family members are injured.

Limitations of this analysis include using self-reported injury and exposure data collected during the same interview. Recall bias was minimized by limiting recall of injury events to the previous six months (Braun et al., 1994; Gerberich et al., 1993; 2004) and recall of exposures to a one-month period within the previous year (Lee et al., 1999).

The "early" measure was assumed to reflect a general pattern of work behavior, based on age, a crude indicator of children's "developmental readiness" for agricultural tasks, and on supervision assumed to be equivalent to checking in every 10-30 minutes. Exposure data collection relevant to NAGCAT task guidelines was limited.

CONCLUSIONS

Although positive associations between injury and all work practices were expected, the increased risk of injury for levels of work typically considered "safe" challenges the perception that the developmental benefits of agricultural work outweigh potential consequences of exposure to agricultural hazards. This study is the first to use population-based case-control data to evaluate the risk of childhood agricultural injury associated with performing developmentally inappropriate chores. Results underscore the importance of a developmental approach for understanding mechanisms of childhood agricultural injury and suggest that the efficacy of age restrictions for preventing the occurrence of childhood agricultural injuries warrants further evaluation.

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Table 1. Respondent Characteristics and Exposures (N = 2311)

	No. (%) of Respondents	
	Case Events (N = 425)	Controls (N = 1886)
Data Collection Year		
1999 Respondents	203 (47.8)	755 (40.0)
2001 Respondents	222 (52.2)	1131 (60.0)
Child Characteristics		
Gender		
Female	133 (31.3)	843 (44.7)
Male	292 (68.7)	1043 (55.3)
Age Groups[a]		
0-5	46 (10.8)	324 (17.2)
6-9	55 (12.9)	306 (16.3)
10-11	48 (11.3)	213 (11.3)
12-13	90 (21.2)	206 (10.9)
14-15	68 (16.0)	248 (13.2)
16-19	118 (27.8)	586 (31.1)
Self-Control[b]		
Almost Never	21 (5.6)	51 (3.3)
Sometimes	10 (2.7)	96 (6.3)
Often	83 (22.3)	273 (17.9)
Almost Always	258 (69.4)	1106 (72.5)
Height-For-Age (Percentile Groups)[c]		
Short (<5)	28 (6.9)	132 (7.7)
Not Short (5-100)	378 (93.1)	1593 (92.4)
Body-Mass-Index-For-Age (Percentile Groups)[d]		
Underweight (0–LT 5)	21 (5.1)	107 (6.2)
Normal (5-LT 85)	243 (59.4)	1044 (60.3)
Overweight risk (85-LT 95)	79 (19.3)	262 (15.1)
Overweight (95–100)	66 (16.1)	317 (18.3)
Prior Children's Injuries		
No prior injury	310 (72.9)	1710 (90.7)
1	59 (13.9)	142 (7.5)
2	28 (6.6)	17 (0.9)
3-4	16 (3.8)	11 (0.6)
GE 5	12 (2.8)	6 (0.3)

Table 1 - continued. Respondent Characteristics and Exposures (N = 2311)

	No. (%) of Respondents	
	Case Events (N = 425)	Controls (N = 1886)
Parent Characteristics		
Parents' Average Age[a]		
Median (Years)	41.5	42.0
Range	24.5-61	22.5-84
Maternal Educational Status[e]		
Less than high-school	7 (1.7)	32 (1.8)
High school graduate	128 (31.3)	553 (31.3)
Technical school	55 (13.4)	264 (15.0)
College	219 (53.5)	915 (51.9)
Number of Children in Household[a]		
Median	3	2
Range	1-10	1-9
Hours Parents Worked on Own Operation[a]		
0 hours	10 (2.4)	8 (0.4)
1 to 10 hours	13 (3.1)	159 (8.7)
11 to 30 hours	108 (25.4)	639 (35.0)
31 to 40 hours	95 (22.4)	402 (22.0)
41 to 60 hours	132 (31.1)	468 (25.6)
60+ hours	67 (15.8)	152 (8.3)
Median Hours	39.5	32.7
Range	2.25-113.1	0-115.8
Prior Household Members' Injuries		
No prior injury	109 (25.7)	817 (43.3)
1	54 (12.7)	397 (21.1)
2	49 (11.5)	230 (12.2)
3-5	100 (23.5)	254 (13.5)
GE 6	113 (26.6)	188 (10.0)

[a]Less than 5% of the data were missing.

[b]Data on self-control were missing for 12.5% of the cases and 19.1% of the controls.

[c]Data on size-for-age were missing for 4.5% of the cases and 8.5% of the controls.

[d]Data on body-mass-index-for-age were missing for 3.8% of the cases and 8.3% of the controls.

[e]Data on maternal education were missing for 3.8% of the cases and 6.5% of the controls.

Table 2. Children's Agricultural Work Practices: Distribution and Association with Childhood Agricultural Injury (N = 2311)

Child Work Practices	No. (%) of Respondents Case Events (N = 425)		Controls (N = 1886)		Odds Ratio[a] (95% Confidence Interval)		
Performed agricultural work							
Did not work	48	(11.8)	745	(40.7)	Reference		
Worked	359	(88.2)	1087	(59.3)	3.9	(2.6	to 5.6)
Interaction term: performing work X children's age					Wald X^2 = 4.3, 1 d.f., p-value = 0.04		
Work Performed Early							
Did not work	48	(11.8)	744	(40.7)	0.2	(0.1	to 0.4)
Did not work early	107	(26.3)	407	(22.3)	Reference		
Worked:1-LE 2 years early	66	(16.2)	189	(10.3)	1.1	(0.7	to 1.8)
Worked:GT 2-LE 3 years early	51	(12.5)	67	(3.7)	2.6	(1.4	to 4.5)
Worked:GT 3-LE 4 years early	33	(8.1)	72	(3.9)	1.4	(0.7	to 2.6)
Worked:GT 4-LE 6 years early	46	(11.3)	137	(7.5)	0.9	(0.5	to 1.6)
Worked: GT 6 years early	56	(13.8)	213	(11.6)	0.7	(0.4	to 1.4)
Interaction term: working early X household agricultural injuries					Wald X^2 = 16.5, 7 d.f., p-value = 0.02		
Hours Children Worked on Own Operation							
Did not work	48	(11.8)	745	(40.8)	0.3	(0.2	to 0.4)
1 to 10 hours	163	(40.1)	641	(35.1)	Reference		
11 to 30 hours	140	(34.5)	323	(17.7)	1.6	(1.2	to 2.1)
31 to 40 hours	31	(7.6)	49	(2.7)	2.2	(1.3	to 3.7)
41 to 60 hours	15	(3.7)	48	(2.6)	1.0	(0.5	to 2.0)
60+ hours	9	(2.2)	21	(1.1)	1.4	(0.5	to 3.6)
Interaction term: hours children worked X number of siblings					Wald X^2 =13.2, 6 d.f., p-value = 0.04		
Number of Types of Chores							
Did not work	49	(12.)	775	(42.3)	0.3	(0.2	to 0.4)
1 chore	45	(11.1)	165	(9.0)	Reference		
2 chores	30	(7.4)	168	(9.2)	0.6	(0.4	to 1.1)
3 chores	43	(10.6)	129	(7.0)	1.2	(0.7	to 2.0)
GE 4- LE 6 chores	105	(25.8)	359	(19.6)	1.1	(0.7	to 1.7)
GE 7 - LE 10 chores	123	(30.2)	200	(10.9)	2.2	(1.3	to 3.5)
GT 10 chores	12	(2.9)	36	(2.0)	1.0	(0.4	to 2.2)
Interaction term: number children's chores X hours parent's worked					Wald X^2 = 15.2, 7 d.f., p-value = 0.03		

[a]Separate multivariable logistic regression analyses were performed for each exposure and interaction product. The statistical models adjusted for: missing values, non-response, year participated, age, gender, BMI, being short, self-control, prior child injuries, prior injuries to household members, parents' age, maternal education, children in household, hours per week parents worked.

Table 3. Characteristics Associated with Childhood Agricultural Injury and Agricultural Work (Results of Multivariable Logistic Regression [N = 2311])

	Childhood Agricultural Injury[f] Odds Ratio (95% Confidence Interval)		Perform Farm Work (Yes/No)[f] Odds Ratio (95% Confidence Interval)	
Data Collection Year				
1999 Respondents	Reference		Reference	
2001 Respondents	0.8	(0.6 to 0.9)	0.8	(0.7 to 1.02)
Child Characteristics				
Gender				
Female	Reference		Reference	
Male	1.9	(1.5 to 2.3)	2.5	(2.0 to 3.0)
Age Groups[a]				
0-5	0.5	(0.3 to 0.7)	0.1	(0.6 to 0.1)
6-9	0.6	(0.4 to 0.9)	0.7	(0.5 to .99)
10-11	0.8	(0.5 to 1.1)	1.3	(0.9 to 1.9)
12-13	1.8	(1.3 to 2.5)	1.5	(1.1 to 2.2)
14-15	1.2	(0.8 to 1.7)	1.7	(1.2 to 2.5)
16-19	Reference		Reference	
Self-Control[b]				
Almost Never	1.7	(0.99 to 3.1)	0.5	(0.3 to 0.8)
Sometimes	0.5	(0.2 to 0.9)	0.8	(0.5 to 1.3)
Often	1.3	(0.9 to 1.7)	1.1	(0.8 to 1.5)
Almost Always	Reference		Reference	
Height-For-Age (Percentile Groups)[c]				
Short (<5)	0.8	(0.5 to 1.2)	0.6	(0.4 to 0.8)
Not Short (5-100)	Reference		Reference	
Body-Mass-Index-For-Age (Percentile Groups)[d]				
Underweight (0–LT 5)	0.7	(0.4 to 1.2)	0.6	(0.4 to 0.9)
Normal (5-LT 85)	Reference		Reference	
Overweight risk (85-LT 95)	1.3	(0.9 to 1.7)	1.3	(0.95 to 1.7)
Overweight (95–100)	0.9	(0.6 to 1.2)	0.8	(0.6 to 1.04)

Table 3 - continued. Characteristics Associated with Childhood Agricultural Injury and Agricultural Work (Results of Multivariable Logistic Regression [N = 2311])

	Childhood Agricultural Injury[f] Odds Ratio (95% Confidence Interval)		Perform Farm Work (Yes/No)[f] Odds Ratio (95% Confidence Interval)	
Prior Child Injuries				
No prior injury	Reference		Reference	
1	1.7	(1.2 to 2.4)	2.8	(1.8 to 4.5)
2	7.2	(3.7 to 13.9)	5.0	(1.1 to 21.8)
3-4	4.7	(2.0 to 11.5)	1.8	(0.4 to 7.0)
GE 5	3.3	(1.1 to 10.2)	2.1	(0.2 to 20.1)
Parent Characteristics				
Parents' Average Age (5-year increments)[a]	0.9	(0.8 to 0.98)	1.1	(1.01 to 1.2)
Maternal Educational Status[c]				
Not high school graduate	0.8	(0.3 to 2.0)	0.5	(0.2 to 1.1)
High school graduate	Reference		Reference	
Technical school	1.0	(0.7 to 1.4)	1.04	(0.8 to 1.4)
College	1.2	(0.9 to 1.5)	0.7	(0.6 to 0.9)
Number of Children in Household[a]	1.4	(1.2 to 1.5)	1.1	(1.01 to 1.2)
Hours Per Week Parents Worked On Own Operation[a]				
0 hours	----	---- ----	0.1	(0.02 to 0.6)
1 to 10 hours	0.3	(0.2 to 0.6)	0.3	(0.2 to 0.4)
11 to 30 hours	0.6	(0.5 to 0.8)	0.7	(0.5 to 0.9)
31 to 40 hours	0.8	(0.6 to 1.1)	0.5	(0.4 to 0.7)
41 to 60 hours	Reference		Reference	
60+ hours	1.6	(1.1 to 2.3)	1.5	(0.96 to 2.2)
Prior Household Members' Injuries				
No prior injury	Reference		Reference	
1	1.0	(0.7 to 1.4)	1.4	(1.06 to 1.9)
2	1.4	(0.9 to 2.0)	1.3	(0.9 to 1.8)
3-5	2.7	(1.9 to 3.7)	1.9	(1.4 to 2.7)
GE 6	3.5	(2.4 to 4.9)	1.6	(1.1 to 2.3)

Table 3 - continued. Characteristics Associated with Childhood Agricultural Injury and Agricultural Work (Results of Multivariable Logistic Regression [N = 2311])

[a]Less than 5% of the data were missing.

[b]Data on self-control were missing for 12.5% of the cases and 19.1% of the controls.

[c] Data on size-for-age were missing for 4.5% of the cases and 8.5% of the controls.

[d]Data on body-mass-index-for-age were missing for 3.8% of the cases and 8.3% of the controls.

[e]Data on maternal educational were missing for 3.8% of the cases and 6.5% of the controls.

[f]Separate multivariable logistic regression analyses were performed for each dependent variable; the statistical models are specified as follows:

Year of data collection – adjusted for: missing values, non-response, age, gender.
Gender – adjusted for: missing values, non-response, year participated, age, parents' age, maternal education, children in household, hours per week parents worked.
Child's age – adjusted for: missing values, non-response, year participated, gender, parents' age, maternal education, children in household, hours per week parents worked.
Self-control – adjusted for: missing values, non-response, year participated, gender, age, parents' age, maternal education, children in household, hours per week parents worked.
Short-for-age – adjusted for: missing values, non-response, year participated, gender, age, parents' age, maternal education, children in household, hours per week parents worked.
Body-mass index (BMI)-for-age – adjusted for: missing values, non-response, year participated, gender, age, parents' age, maternal education, children in household, hours per week, parents worked.
Prior child injuries – adjusted for: missing values, non-response, year participated, gender, age, BMI, short, self-control, parents' age, maternal education, children in household, hours per week parents worked, prior injuries to household members.
Parents' age – adjusted for: non-response, year participated.
Maternal education – adjusted for: missing values, non-response, year participated, parents' age, hours per week parents worked, children in household.
Children in household – adjusted for: missing values, non-response, year participated, parents' age, maternal education, hours per week parents worked.
Hours per week head of household worked – adjusted for: missing values, non-response, year participated, parents' age, maternal education, children in household.
Prior injuries to household members – adjusted for: missing values, non-response, year participated, age, gender, BMI, short, self-control, prior child injuries, parents' age, maternal education, children in household, hours per week parents worked.

Table 4. Characteristics Associated with Children's Agricultural Work Practices (Results of Multivariable Linear Regression [N = 2311])

	No. Hours Worked[f]		No. Chores Performed[f]		Working Early[f]	
	β (95% Confidence Interval)		β (95% Confidence Interval)		β (95% Confidence Interval)	
Data Collection Year						
1999 Respondents	Reference		Reference		Reference	
2001 Respondents	-1.4	(-2.4 to -0.3)	-0.2	(-0.4 to 0.1)	-0.02	(-0.2 to 0.2)
Child Characteristics						
Gender						
Female	Reference		Reference		Reference	
Male	6.5	(5.5 to 7.6)	1.6	(1.4 to 1.8)	0.3	(0.1 to 0.5)
Age Groups[a]						
0-5	-13.6	(-15.5 to -11.8)	-3.7	(-4.1 to -3.3)	2.3	(1.9 to 2.6)
6-9	-10.7	(-12.4 to -9.0)	-2.7	(-3.0 to -2.3)	4.8	(4.4 to 5.1)
10-11	-8.1	(-9.9 to -6.3)	-1.9	(-2.3 to -1.5)	3.5	(3.1 to 3.9)
12-13	-3.3	(-5.0 to -1.6)	-0.4	(-0.8 to -0.1)	2.1	(1.8 to 2.5)
14-15	-1.9	(-3.6 to -0.3)	0.1	(-0.3 to 0.4)	0.8	(0.4 to 1.1)
16-19	Reference		Reference		Reference	
Self-Control[b]						
Almost Never	-3.5	(-6.5 to -0.6)	-0.5	(-1.2 to 0.1)	-0.2	(-0.8 to 0.4)
Sometimes	-3.2	(-5.6 to -0.7)	-0.3	(-0.8 to 0.3)	-0.3	(-0.8 to 0.2)
Often	-0.7	(-2.2 to 0.7)	0.3	(-0.01 to 0.6)	0.1	(-0.2 to 0.4)
Almost Always	Reference		Reference		Reference	
Height-For-Age (Percentile Groups)[c]						
Short (<5)	-1.3	(-3.4 to 0.8)	-0.4	(-0.9 to -0.01)	0.4	(-0.004 to 0.9)
Not Short (5-100)	Reference		Reference		Reference	

Table 4 - continued. Characteristics Associated with Children's Agricultural Work Practices (Results of Multivariable Linear Regression [N = 2311])

	No. Hours Worked[f] β (95% Confidence Interval)		No. Chores Performed[f] β (95% Confidence Interval)		Working Early[f] β (95% Confidence Interval)	
Body-Mass-Index-For-Age (Percentile Groups)[d]						
Underweight (0–LT 5)	-0.5	(-2.8 to 1.8)	-0.5	(-1.0 to -0.03)	-0.1	(-0.5 to 0.4)
Normal (5-LT 85)	Reference		Reference		Reference	
Overweight risk (85-LT 95)	0.2	(-1.3 to 1.6)	0.3	(0.01 to 0.6)	0.3	(-0.017 to 0.6)
Overweight (95–100)	-0.6	(-2.1 to 0.9)	-0.3	(-0.6 to 0.03)	0.2	(-0.1 to 0.5)
Prior Child Injuries						
No prior injury	Reference		Reference		Reference	
1	2.0	(0.2 to 3.8)	1.0	(0.6 to 1.3)	0.5	(0.1 to 0.9)
2	7.3	(3.6 to 10.9)	1.8	(1.0 to 2.5)	0.2	(-0.5 to 1.0)
3-4	6.1	(1.2 to 11.0)	0.2	(-0.8 to 1.3)	-0.5	(-1.6 to 0.5)
GE 5	4.8	(-1.3 to 10.9)	0.7	(-0.6 to 2.0)	-0.9	(-2.2 to 0.4)
Parent Characteristics						
Parents' Average Age (5-year increments)[a]	1.9	(1.5 to 2.3)	0.5	(0.4 to 0.5)	-0.5	(-0.6 to -0.4)
Maternal Educational Status[c]						
Not high school graduate	0.3	(-4.1 to 4.7)	-0.5	(-1.5 to 0.4)	-0.5	(-1.5 to 0.5)
High school graduate	Reference		Reference		Reference	
Technical school	-0.6	(-2.3 to 1.2)	0.1	(-0.3 to 0.5)	0.3	(-0.1 to 0.7)
College	-2.2	(-3.5 to -0.9)	-0.5	(-0.8 to -0.2)	0.2	(-0.1 to 0.5)
Number of Children in Household[a]	-0.1	(-0.6 to 0.3)	0.02	(-0.1 to 0.1)	0.2	(0.1 to 0.3)
Hours Per Week Parents Worked On Own Operation[a]						
0 hours	-7.1	(-16.0 to 1.9)	-2.3	(-4.3 to -0.4)	-0.9	(-2.9 to 1.1)
1 to 10 hours	-7.7	(-10.1 to -5.4)	-1.8	(-2.3 to -1.3)	-0.6	(-1.2 to -0.1)
11 to 30 hours	-4.4	(-5.8 to -2.9)	-0.8	(-1.1 to -0.5)	-0.2	(-0.5 to 0.2)
31 to 40 hours	-2.8	(-4.4 to -1.2)	-0.4	(-0.8 to -0.1)	-0.2	(-0.6 to 0.1)
41 to 60 hours	Reference		Reference		Reference	
60+ hours	5.4	(3.3 to 7.5)	0.6	(0.1 to 1.0)	0.0	(-0.5 to 0.4)

Table 4 - continued. Characteristics Associated with Children's Agricultural Work Practices (Results of Multivariable Linear Regression [N = 2311])

	No. Hours Worked[f]		No. Chores Performed[f]		Working Early[f]	
	β (95% Confidence Interval)		β (95% Confidence Interval)		β (95% Confidence Interval)	
Prior Household Members' Injuries						
No prior injury	Reference		Reference		Reference	
1	0.0	(-1.4 to 1.3)	0.5	(0.2 to 0.7)	0.2	(-0.1 to 0.5)
2	-1.3	(-3.0 to 0.4)	0.4	(0.1 to 0.8)	0.4	(-0.003 to 0.7)
3-5	0.5	(-1.0 to 2.1)	0.7	(0.3 to 1.0)	0.7	(0.4 to 1.1)
GE 6	-0.5	(-2.2 to 1.2)	0.6	(0.2 to 1.0)	0.4	(0.1 to 0.8)

β = unstandardized beta estimate of the change in Y for a one unit change in X, adjusting for all other covariates in the statistical model.

[a]Less than 5% of the data were missing.

[b]Data on self-control were missing for 12.5% of the cases and 19.1% of the controls.

[c] Data on size-for-age were missing for 4.5% of the cases and 8.5% of the controls.

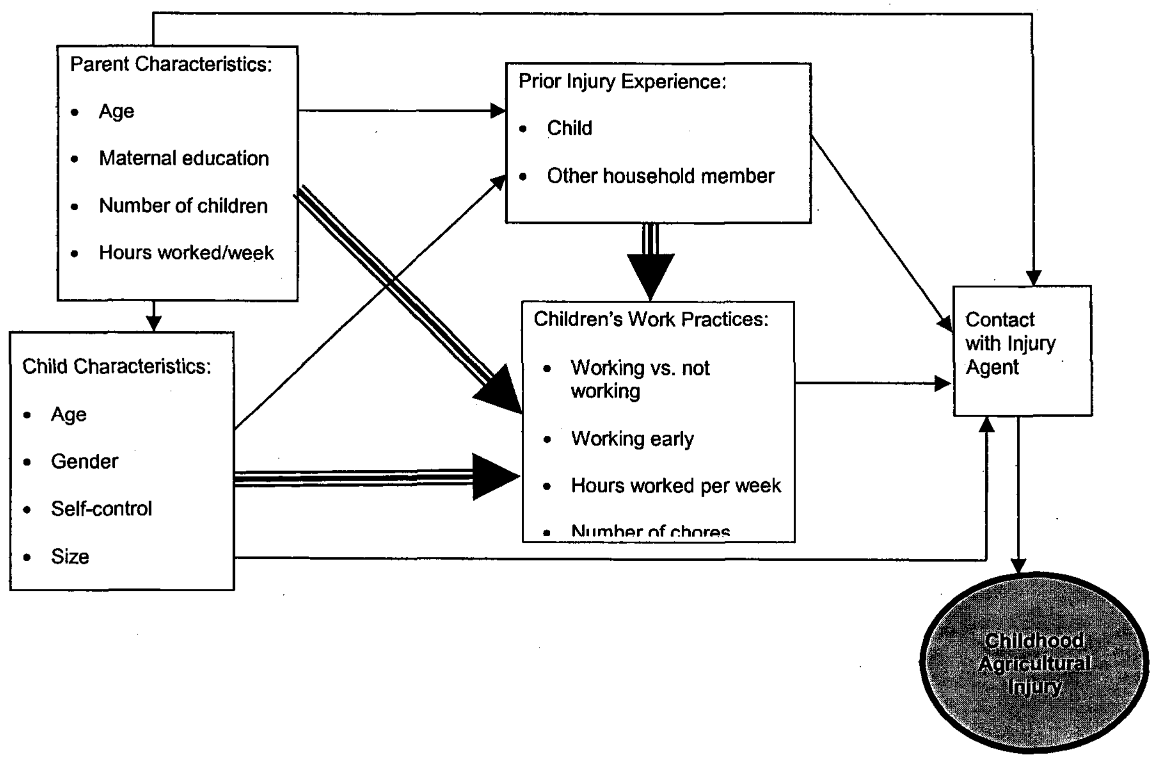
[d]Data on body-mass-index-for-age were missing for 3.8% of the cases and 8.3% of the controls.

[e]Data on maternal educational were missing for 3.8% of the cases and 6.5% of the controls.

[f]Separate multivariable linear regression analyses were performed for each dependent variable. The statistical models are equivalent to those specified in Table 3, and were additionally adjusted for case-control status.

Figure 1. Conceptual Model – Children's Work Practices and Childhood Agricultural Injury

Thick triple line = Effect of variable at arrow head is modified by the variable at the arrow tail
Note: Year of Participation (1999/2001) is included in all statistical models, but is not shown here.



CHAPTER V

PARENTS' SAFETY BELIEFS AND CHILDHOOD AGRICULTURAL INJURY

ABSTRACT

Objectives: To evaluate whether parents' safety beliefs were associated with the assignment of children's chores and reduced risk of agricultural injury and to identify safety belief predictors.

Methods: Analyses were based on nested case-control data collected by the Regional Rural Injury Study-II (RRIS-II) surveillance effort in 1999 and 2001 by computer-assisted telephone interviews. Cases (n = 425) and controls (n = 1886) were persons younger than 20 years of age from Midwestern agricultural households. All injury events were selected as cases; controls were selected using incidence density sampling. Multivariate logistic regression was used to estimate the risk of agricultural injury for parental monitoring and beliefs about the importance of children's cognitive and physical readiness to perform tasks.

Results: A reduced risk for childhood agricultural injury was associated with "moderate" versus "very strict" monitoring (odds ratio [OR] = 0.70, 95% confidence interval [CI] = 0.50-0.97) and parents having more conservative beliefs about the importance of physical readiness (OR = 0.90, 95% CI = 0.70 – 0.99). A reduced risk for injury was suggestive for parents having more conservative beliefs about the importance of cognitive readiness, significantly so for females (OR = 0.50, 95% CI = 0.40 – 0.8), and for working aged children, 7-16 years of age (OR = 0.70, 95% CI = 0.50 – 0.90). Parents' safety beliefs were not associated with chore assignments.

Conclusions: Parents' safety beliefs were associated with reduced risk of childhood agricultural injury but not chore assignment. These results may guide further research and relevant intervention efforts.

INTRODUCTION

In the home environment, childhood injury is reportedly prevented through parental supervision of children around potential hazards and the injury socialization of children – where they are taught to recognize and avoid hazards (Peterson and Stern, 1997). At work, regulations and standards limit hazardous exposures and keep children safe. On family agricultural operations, children are exposed to occupational hazards but these operations are mostly exempt from federal labor and safety regulations (Kelsey, 1994; USDOL, 1984), leaving parents primarily responsible for the hazards encountered by the 1.5 million children younger than 20 years old who live and work on United States agricultural operations (Hendricks et al., 2004) and for the appropriateness of the agricultural chores assigned to them. To help parents assess the developmental appropriateness of agricultural work, the *North America Guidelines for Children's Agricultural Tasks* (NAGCAT) were recently published, providing voluntary age standards for 62 common tasks (Lee and Marlenga, 1999).

Participation in agricultural work is expected of children (Elder and Conger, 2000) and thought to be beneficial: developing children's work ethic; teaching responsibility; providing family time; and contributing to the operation's economic sustainability (Elder and Conger, 2000; Elkind, 1993; Kelsey, 1994; Kidd et al., 1997; Lee et al., 1997, Tevis, 1997). The costs of agricultural work include being exposed to agricultural machinery, livestock, chemicals and zoonoses, and being potentially at higher risk of injuries, reproductive and nervous system damage, and some cancers (Perry, 2003). Children less than 20 years old incurred an estimated 22,648 agricultural injuries in 2001 (Hendricks et al., 2004) and averaged 116 agriculture fatalities a year between1995-2000 (annualized rate: 9.3 per 100,000 youth, Goldcamp et al., 2004).

Children's agricultural injuries are predictable, given the mismatch between the hazards that exist on agricultural operations and the developmental abilities of youth who play near agricultural hazards or are often assigned age-inappropriate tasks (Elkind, 1993; Lee, 1997; Marlenga et al., 2001a; Marlenga et al, 2001b). Chore assignment is not typically based on assessment of children's developmental ability; parents report being guided by their intuition, tasks they had performed as children, or expert opinion about children's readiness (Tevis, 1997). To better understand how parenting influenced agricultural injury, this study evaluated whether parental safety beliefs were associated with agricultural chore assignment and the risk of agricultural injury.

METHODS

Study Design and Subjects

This study was based on nested case-control data collected in the Regional Rural Injury Study-II (RRIS-II) surveillance effort in 1999 and 2001. The RRIS-II was designed to identify the incidence and consequences of, and risk factors for children's agricultural injuries and is described elsewhere (Gerberich et al., 2004, 2002, 2001). RRIS-II materials are available at http://enhs.umn.edu/riprc/riprc.html. Approval was obtained from the University of Minnesota, Institutional Review Board, Human Subjects Committee.

A random sample of 16,000 agricultural operations (3,200 from each participating state (Minnesota, Wisconsin, North Dakota, South Dakota, and Nebraska) was generated from the U.S. Department of Agriculture's National Agricultural Statistics Service (NASS) Master ListFrame of Agricultural Operations for each data collection year. Households were eligible if, as of January 1 (1999/2001), they actively farmed or ranched, included children younger than 20 years of age in residence, and had produced at least $1,000 of agricultural goods in the prior year, or participated in a Conservation Reserve Program (CRP).

Cases (n = 425) and controls (n = 1886) were persons younger than 20 years of age, identified from the RRIS-II database. All injury events were selected as cases. Controls were selected using incidence density sampling. Agricultural injuries were defined as events incurred as a result of performing, or being associated with, an activity related to the agricultural operation that resulted in one or more of the following: restriction from normal activities for four hours or more; loss of consciousness or awareness, or amnesia for any length of time; or use of professional health care.

Monitoring and children's work practice frequencies differed by year of participation. An indicator was included in all multivariate analyses to adjust for these differences and for factors represented by declines in the rate of agricultural injuries to males younger than 20 years old and number of injuries to all youths living on U.S. operations between 1998 and 2001 (Hendricks et al., 2004).

Data Collection

Operations were mailed letters of introduction, including informed consent information, and were subsequently interviewed to determine eligibility and willingness to participate in the following full interviews. Computer-assisted telephone interviews were conducted by NASS interviewers for each six-month period of each study year to ascertain injury incidence and relevant consequences. Case exposures were ascertained for the month prior to injury occurrence; control exposures were ascertained for a random one-month period within the study period, based on an algorithm of expected injury occurrence (Gerberich et al., 1993 [RRIS-I, 1990]; Gerberich et al., 2003 [RRIS-II, 1999]).

Measures

The following parental safety beliefs were the exposures of primary interest:

Monitoring – As a proxy measure for their beliefs about the importance of supervision, parents self-reported their monitoring behavior for the previous month for knowing where their children were and with whom, using four-point Likert scales, with options of (1) = *not strict* through (4) = *very strict*. Chronbach's alpha = 0.84, was calculated for the monitoring scale, indicating high internal reliability based on the average inter-item correlation.

Importance of task readiness – Two constructs measured parental beliefs about the importance of developmental characteristics when deciding whether their child was ready to do a new chore on the operation: (a) beliefs about the importance of children's age and size were summed and used as a proxy measure of the importance of children's "physical readiness" and; (b) beliefs about the importance of children's maturity and skills were summed and used as a proxy measure of the importance of "cognitive readiness." Four-point Likert scales, with response options of (1) = *not important* through (4) = *very important* were used, higher scores reflected more conservative attitudes about when a child was ready to perform a new task. Chronbach's alphas for physical and cognitive readiness were 0.63 and 0.59, respectively, indicating moderate internal reliability.

In addition to childhood agricultural injury, the following work practices, reflecting parental chore assignments, were modeled as dependent variables.

Performing work – A dichotomous variable (yes/no) based on parents' response to the question, "During the [prior month] did [your child] work in any type of activities or do chores related to your operation?"

Number of chores – The number of types of agricultural chores children performed in the previous month from a possible 18 chores that were performed by at least 10% of the respondents: working with beef and dairy cattle (calving, feeding, cleaning, herding), swine, horses, and poultry; operating vehicles (tractor, car, truck, motor cycle, ATV, snow mobile, other large equipment); using hand and/or power tools; and working in storage structures or with agricultural chemicals.

Average hours worked per week – The hours per week children worked on their agricultural operations were grouped to reflect patterns of part-time (1-10, 11-30, 31-40), full-time (41-60), and over-time (more than 60).

Working early – Children performing tasks when younger than recommended were designated as working early ("early"). The NAGCAT age recommendations for task performance with intermittent supervision (Lee and Marlenga, 1999) were used as the standard for developmentally appropriate work for tasks associated with animals, all-terrain vehicles (ATVs), tractors, large equipment operation, and storage structures. The minimum age for calving, working with bulls, small power tools, and handling chemicals was set at 16 years of age, based on their inclusion in the *Hazardous Occupations Order for Agriculture* (HOOA) (USDOL, 1984). The minimum age for operating motor vehicles was 15 years of age, based on state motor vehicle licensing requirements.

Differences between the age recommended for task performance and children's actual age were calculated as a measure of the developmental gap between each task and children's physical, cognitive, and behavioral maturity. Task-specific risk scores were summed for each child and divided by the number of chores performed. The averaged scores were grouped into seven categories: not working; performing age appropriate work; and working an average of 2 years, > 2 to ≤3 years, > 3 to ≤4 years, > 4 to ≤6 years, or > 6 years younger than recommended.

Parent-related covariates included averaged ages, mothers' highest level of education, number of children in household, and hours per week worked on their agricultural operation. Child-related covariates included age, gender, and:

Self-control – Behavioral characteristics in children older than five years old that potentially influenced task performance. Parents responded to four-point Likert scales, with options of (1) *almost never* through (4) *almost always* to rate whether children: paid attention; concentrated; were cautious; [were not] easily distracted; worked hard; [did not] break rules, [were not] impulsive; and [did not] act without thinking, The responses were summed and divided by the number of non-missing items. Chronbach's alpha = 0.78 was calculated for the self-control scale, indicating high internal consistency.

Size-for-age – Percentile values for height-for-age and body-mass index (BMI) were generated, comparing each child against national measurements of children of the same age and gender (NCHS, 2000). The height percentiles were grouped into "short" ($\leq 5^{th}$) and "not short" ($> 5^{th}$ to 100); BMI percentiles were grouped into "underweight" ($\leq 5^{th}$), "normal" ($> 5^{th}$ to 85^{th}), "at risk of overweight" ($> 85^{th}$ to 95^{th}), and overweight ($> 95^{th}$ to 100) (CDCP, 2005).

Prior injuries indicated prior agricultural injuries experienced by the child or by household members, other than the child.

Data Analysis

A causal model, based on hypothesized associations between agricultural work practices, relevant covariates, and childhood agricultural injury, served as the basis for data analysis (Figure 1). Year of participation was included in all multivariate regression analyses to minimize variance; directed acyclic graphs guided the inclusion of additional covariates (Greenland et al., 1999).

Descriptive statistics were generated for covariates by case-control strata. Odds ratios (ORs) and 95% confidence intervals (95% CI) for the risk of agricultural injury and "performing agricultural work" were calculated with multivariate logistic regression. Interaction terms were constructed for each safety belief-covariate pair and tested for significance. Multivariate linear regression evaluated the likelihood of hours worked, performing chores, and working early per unit change in the safety belief variables.

Adjustments for non-response in the presence of unknown eligibility among non-respondents were made by inversely weighting observed responses with probabilities of response (Horvitz and Thompson, 1952), estimated as a function of characteristics available from the NASS Master List-Frame of Agricultural Operations (state, type of operation, and annual revenue by quintile), and adjusted for the estimated probability of eligibility among the sample members with the same characteristics (Mongin, 2001).

Sensitivity analyses enabled assessment of potential biases from (a) the omission of a confounder of the monitoring-injury association, such as task/environment hazardousness, that increased the odds of injury by factors of 5, 10, and 15 (Rothman and Greenland, 1998); and (b) missing monitoring data. The analyses were performed with the 2,197 respondents (413 cases and 1784 controls) who responded to the monitoring questions; monitoring was recoded into a dichotomous variable indicating whether children were strictly monitored (yes/no).

RESULTS

Participant and parent characteristics are presented in Table 1. Cases and controls were most commonly male, aged 16-19 years, of normal weight and height, and "almost always" exhibited self-control; having no prior agricultural injuries was most commonly reported for children and for the other household members. Case parents had more children than did control parents and worked more on their operation.

Children were at decreased risk of childhood agricultural injury if their parents reported "moderate" versus "very strict" monitoring or were more conservative about the importance of cognitive and physical readiness for undertaking new chores (Table 2); this was more important for working aged children (7-16 years old). Parental safety beliefs did not predict children's chore assignments (not shown).

The importance of cognitive readiness interacted significantly with parents' age; increased importance was associated with decreased injury risk across most parental age groups. The association was reversed for parents aged 39-44 (OR = 1.7, 95% CI = 0.7 – 3.9 [not shown]). An interaction between cognitive readiness and children's gender was suggestive; having parents believe that cognitive readiness was important, compared to somewhat important, increased the risk of injury for girls but not for boys ($OR_{females}$ = 2.8, 95% CI = 1.2-6.7 [not shown]).

When covariate-safety belief associations were examined (Table 3), the three safety beliefs were positively associated with each other. Being younger than 16 years old, a 2001 respondent, and having parents who did not work on the operation, were also associated with increased parental monitoring. Decreased monitoring was associated with children sometimes exhibiting self-control, having older parents, and having parents who worked more than 60 hours a week. Being 10-11 years old and mother having a college education were associated with increased importance of cognitive readiness. Being six to nine years old was associated with increased importance of physical readiness. Low levels of self-control were associated with decreased importance of both physical and cognitive readiness. Having five or more prior agricultural injuries was associated with decreased importance of cognitive readiness.

The unadjusted OR and 95% confidence interval for agricultural injury obtained in the sensitivity analyses for "strict parental monitoring (yes/no)" was OR = 1.84, 95% CI = 0.93-1.5. When the presence of a potential confounder, such as task/environment hazardousness, was controlled for in the sensitivity analysis, the resulting ORs ranged between 0.36-3.89, even when the confounder increased the odds of childhood injury by as little as five. The assessment of the influence of missing data on the association between monitoring and childhood agricultural injury was supportive of the original results.

DISCUSSION

Supervision is a fundamental parenting strategy used to keep children safe; prior research suggests that it is protective for injuries, in general (Morrongiello et al., 2001; Morrongiello and House, 2004; Peterson et al., 1987). In the current study, being "moderately" versus "very strictly" monitored was associated with a reduced risk of childhood agricultural injury. The factors associated with increased monitoring (Table 3) suggest that strict monitoring possibly reflects an appropriate parental reaction to factors that increase vulnerability or risk. For example, children who are short may be perceived as more vulnerable; children 12-15 years old or at-risk of overweight may be inaccurately perceived as more competent and assigned more hazardous work; and parents who do not work on the operation may compensate for not being physically present on the operation by monitoring in other ways.

The risk of agricultural injury was decreased for children of parents with stronger, or more conservative, task readiness beliefs. That having parents who do not believe cognitive readiness is important, increased the risk of injury for girls, but not boys, suggests a potential gender-related mechanism that warrants further research; this is important given that the rate of agricultural injuries among girls aged 10-15 years old living on agricultural operations more than doubled between 1998-2001 (Hendricks et al., 2004). This association may be partially explained by parent's reacting to increased risk-taking among boys (Bijttebier et al., 2003) or parental expectations of earlier autonomy and maturity from daughters (Dekovic et al., 1997).

Safety beliefs were expected to be associated with chore assignment. These associations were not found in this study and suggest that the protective associations between safety beliefs and injury are not mediated by the work practices currently measured. The lack of association may be partially explained by parents weighing children's vulnerability and perceived risk in conjunction with other factors when assigning agricultural chores. For instance, although parents' knowledge of child development was associated with more frequent use of the NAGCAT age guidelines and fewer age violations, when assigning tractor work, 20% of parents with perfect knowledge scores assigned chores that violated age guidelines (Pickett et al., 2003). Similarly, although parental risk perceptions were weakly associated with making safety changes and using NAGCAT guidelines, 48% of parents with the highest risk perceptions were not using the NAGCAT (Zentner et al., 2005).

Safety beliefs may also reflect underlying parenting processes or attributes, such as parents' conscientiousness, being well organized, and having high standards that better predict children's injuries than do specific parenting practices/supervisory behaviors (Morrongiello, 2005). For example, in the current study, parents of girls who had stronger beliefs about the importance of task readiness may have managed risk by providing "scaffolding," defined by Masten (in press), as extra support during periods of vulnerability, when children are asked to perform new tasks but are not developmentally able to execute them safely. This could include non-supervisory processes for reducing childhood injury risk such as modifying the environment or teaching children safety-related beliefs or behaviors. In this study, the decreased importance of cognitive readiness associated with having five or more prior child injuries may have reflected prior causal associations between parenting attributes and prior injuries.

Determinants of parents' safety and child development beliefs are infrequently examined, although associations with socio-economic variables have been previously suggested. Rivara and Howard (1982) found child development knowledge was positively correlated with parents' education levels and their safety knowledge and was negatively associated with the number of children in the family. Pickett et al. (2003), found that higher child development knowledge scores were associated with parents who were younger, better educated, and female. The associations observed for socio-economic factors in the current study included that: maternal college education was associated with increased importance of cognitive readiness; parents not working on the operation was associated with increased monitoring; parental work weeks of 60 or more hours were associated with decreased monitoring; and parental work weeks of 1-10 hours were associated with decreased importance of cognitive readiness.

The safety beliefs evaluated in the current study have several limitations. Monitoring, a measure of parents' knowledge about children's activities, was used in this study as an indicator of parental supervisory behavior. Correlations between monitoring and the actual supervision of occupational tasks and between parents' ratings of the importance of physical or cognitive readiness and children's developmental status were unknown and could not be adjusted for in this analysis. Measurement error in parental safety beliefs or children's work practices could have contributed to the lack of association observed between them.

Sensitivity analysis was employed to assess the potential bias that might result from the differential prevalence of an unmeasured confounder (Rothman and Greenland, 1998); the magnitude and directions of the generated associations suggest that potential confounders of the association between monitoring and childhood agricultural injury be further investigated. Data for injuries and related exposures were collected at the same time, and parental recall of perceptions related to safety beliefs could have been biased by injury experience. Recall bias was minimized by collecting injury and exposure data at multiple time points, and limiting recall of injury events to the previous six months (Braun et al., 1994; Gerberich et al., 2004, 1993) and recall of exposures to a one-month period within the previous year (Lee et al., 1999). In addition, prior to each six-month interview, packets were sent to study households, which enabled events and other information to be recorded in preparation for the interviews.

CONCLUSIONS

This study is the first to use population-based case-control data to examine the risk of agricultural injury associated with parental safety beliefs. Moderate levels of monitoring and increased importance of cognitive and physical readiness were associated with a reduced risk of childhood agricultural injury; safety beliefs were not associated with the assignment of agricultural chores. The results serve as the basis for future analytical studies of parenting-related mechanisms associated with the risk of childhood agricultural injury and for ultimate development of appropriate prevention and control efforts.

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Table 1. Respondent Characteristics and Exposures (N = 2311)

	No. (%) of Respondents			
	Case Events (N = 425)		Controls (N = 1886)	
Data Collection Year				
1999 Respondents	203	(47.8)	755	(40.0)
2001 Respondents	222	(52.2)	1131	(60.0)
Child Characteristics				
Gender				
Female	133	(31.3)	843	(44.7)
Male	292	(68.7)	1043	(55.3)
Age Groups[a]				
0-5	46	(10.8)	324	(17.2)
6-9	55	(12.9)	306	(16.3)
10-11	48	(11.3)	213	(11.3)
12-13	90	(21.2)	206	(10.9)
14-15	68	(16.0)	248	(13.2)
16-19	118	(27.8)	586	(31.1)
Self-Control[b]				
Almost Never	21	(5.6)	51	(3.3)
Sometimes	10	(2.7)	96	(6.3)
Often	83	(22.3)	273	(17.9)
Almost Always	258	(69.4)	1106	(72.5)
Height-For-Age (Percentile Groups)[c]				
Short (<5)	28	(6.9)	132	(7.7)
Not Short (5-100)	378	(93.1)	1593	(92.4)
Body-Mass-Index-For-Age (Percentile Groups)[d]				
Underweight (0–LT 5)	21	(5.1)	107	(6.2)
Normal (5-LT 85)	243	(59.4)	1044	(60.3)
Overweight risk (85-LT 95)	79	(19.3)	262	(15.1)
Overweight (95–100)	66	(16.1)	317	(18.3)
Prior Children's Injuries				
No prior injury	310	(72.9)	1710	(90.7)
1	59	(13.9)	142	(7.5)
2	28	(6.6)	17	(0.9)
3-4	16	(3.8)	11	(0.6)
GE 5	12	(2.8)	6	(0.3)

Table 1 - continued. Respondent Characteristics and Exposures (N = 2311)

	No. (%) of Respondents	
	Case Events (N = 425)	**Controls (N = 1886)**
Parent Characteristics		
Parents' Average Age[a]		
Median (Years)	41.5	42.0
Range	24.5-61	22.5-84
Maternal Educational Status[e]		
Less than high-school	7 (1.7)	32 (1.8)
High school graduate	128 (31.3)	553 (31.3)
Technical school	55 (13.4)	264 (15.0)
College	219 (53.5)	915 (51.9)
Number of Children in Household[a]		
Median	3	2
Range	1-10	1-9
Hours Per Week Parents Worked On Own Operation[a]		
0 hours	10 (2.4)	8 (0.4)
1 to 10 hours	13 (3.1)	159 (8.7)
11 to 30 hours	108 (25.4)	639 (35.0)
31 to 40 hours	95 (22.4)	402 (22.0)
41 to 60 hours	132 (31.1)	468 (25.6)
60+ hours	67 (15.8)	152 (8.3)
Median Hours	39.5	32.7
Range	2.25-113.1	0-115.8
Prior Household Members' Injuries		
No prior injury	109 (25.7)	817 (43.3)
1	54 (12.7)	397 (21.1)
2	49 (11.5)	230 (12.2)
3-5	100 (23.5)	254 (13.5)
GE 6	113 (26.6)	188 (10.0)

[a]Less than 5% of the data were missing.

[b]Data on self-control were missing for 12.5% of the cases and 19.1% of the controls.

[c]Data on size-for-age were missing for 4.5% of the cases and 8.5% of the controls.

[d]Data on body-mass-index-for-age were missing for 3.8% of the cases and 8.3% of the controls.

[e]Data on maternal education were missing for 3.8% of the cases and 6.5% of the controls.

Table 2. Parents' Safety Beliefs: Association with Childhood Agricultural Injury (N = 2311)

0-19 Years of Age	No. (%) of Respondents: Case Events (N = 425)	Controls (N = 1886)	Odds Ratio[b] (95% Confidence Interval)
Monitoring[a]			
Not – Somewhat	41 (10.0)	155 (8.7)	1.1 (0.7 to 1.6)
Moderate	70 (16.7)	386 (21.6)	0.7 (0.5 to 0.97)
Very	302 (73.4)	1243 (69.7)	Reference
Cognitive Task Readiness: Maturity/Skills[a]			
All Children	416 (50.0)	1855 (50.0)	0.9 (0.7 to 1.1)
Males only	286 (15.6)	1029 (22.3)	1.2 (0.9 to 1.6)
Females only	130 (34.4)	826 (27.7)	0.5 (0.4 to 0.8)
Interaction Term: cognitive X gender			Wald $X^2 = 3.8$; p-value = 0.052
Interaction Term: cognitive X parent age			Wald $X^2 = 3.9$; p-value = 0.048
Median Value	4.0	4.0	
Range	1.5-4	1-4	
Physical Task Readiness: Age/Size[a]			
All Children	417	1855	0.9 (0.7 to 0.99)
Median Value	3.5	3.5	
Range	1-4	1-4	
7-16 Years of Age	**(N = 287)**	**(N = 1044)**	
Monitoring[a]			
Not – Somewhat	19 (6.6)	54 (5.2)	1.1 (0.6 to 2.1)
Moderate	40 (13.9)	195 (18.7)	0.6 (0.4 to 0.9)
Very	222 (77.4)	769 (73.7)	Reference
Cognitive Task Readiness: Maturity/Skills[a]			
All Children	279 (50.0)	1025 (50.0)	0.7 (0.5 to 0.9)
Males only	192 (34.0)	572 (28.0)	1.1 (0.7 to 1.6)
Females only	87 (15.6)	453 (22.1)	0.3 (0.2 to 0.5)
Median Value	4.0	4.0	
Range	1.5-4	1.5-4	
Physical Task Readiness: Age/Size[a]			
All Children	280	1025	0.8 (0.6 to 0.95)
Median Value	3.0	3.5	
Range	1-4	1-4	

[a]Less than 5% of the data were missing.
[b]Separate multivariable logistic regression analyses were performed for each exposure variable. The statistical models adjusted for: missing values, non-response, year participated, age, gender, BMI, short, self-control, prior child injuries, prior injuries to household members, parents' age, maternal education, children in household, hours per week parents worked.

Table 3. Characteristics Associated with Parents' Safety Beliefs (Results of Multivariable Linear Regression [N = 2311])

	Types of Parental Safety Beliefs[g]								
	Monitoring			Task Readiness: Maturity/Skill Important			Task Readiness: Age/Size Important		
Data Collection Year	β (95% Confidence Interval)			β (95% Confidence Interval)			β (95% Confidence Interval)		
1999 Respondents	Reference			Reference			Reference		
2001 Respondents	0.07	0.01	0.12	-0.01	-0.05	0.03	-0.07	-0.13	0.00
Child Characteristics									
Gender Female	Reference			Reference			Reference		
Male	-0.06	-0.11	0.00	-0.01	-0.05	0.03	-0.03	-0.09	0.03
Age Groups[a]									
0-5	0.64	0.54	0.74	-0.04	-0.11	0.03	0.07	-0.05	0.18
6-9	0.56	0.47	0.65	0.06	-0.01	0.13	0.11	0.01	0.22
10-11	0.60	0.50	0.70	0.09	0.01	0.16	0.04	-0.07	0.15
12-13	0.53	0.44	0.62	0.05	-0.02	0.12	-0.09	-0.19	0.01
14-15	0.45	0.36	0.54	0.04	-0.02	0.11	-0.04	-0.14	0.06
16-19	Reference			Reference			Reference		
Self-Control[b]									
Almost Never	-0.10	-0.26	0.06	-0.22	-0.33	-0.10	-0.21	-0.39	-0.03
Sometimes	-0.14	-0.27	-0.01	-0.14	-0.24	-0.04	0.00	-0.15	0.15
Often	-0.07	-0.15	0.01	-0.04	-0.10	0.02	-0.05	-0.14	0.04
Almost Always	Reference			Reference			Reference		
Height-For-Age (Percentile Groups)[c]									
Short (<5)	0.09	-0.02	0.21	-0.06	-0.14	0.02	0.06	-0.06	0.19
Not Short (5-100)	Reference			Reference			Reference		
Body-Mass-Index-For-Age (Percentile Groups)[d]									
Underweight (0–LT 5)	0.00	-0.13	0.12	-0.09	-0.19	0.01	-0.01	-0.15	0.14
Normal (5-LT 85)	Reference			Reference			Reference		
Overweight risk (85-LT 95)	0.06	-0.02	0.14	-0.01	-0.07	0.05	0.05	-0.04	0.14
Overweight (95–100)	0.03	-0.05	0.11	-0.05	-0.11	0.01	0.02	-0.07	0.11

Table 3 - continued. Characteristics Associated with Parents' Safety Beliefs (Results of Multivariable Linear Regression)

Prior Injuries	Monitoring β (95% Confidence Interval)			Maturity/Skill Important β (95% Confidence Interval)			Age/Size Important β (95% Confidence Interval)		
Child: No prior injury	Reference			Reference			Reference		
1	-0.03	-0.13	0.07	-0.05	-0.12	0.03	-0.06	-0.17	0.05
2	0.00	-0.20	0.19	0.01	-0.14	0.15	0.04	-0.18	0.26
3-4	-0.16	-0.42	0.10	-0.01	-0.21	0.18	0.19	-0.10	0.49
GE 5	-0.11	-0.44	0.22	-0.48	-0.72	-0.23	-0.05	-0.42	0.32
Household: No prior injury	Reference			Reference			Reference		
1	0.05	-0.03	0.12	0.03	-0.03	0.08	0.00	-0.08	0.09
2	0.02	-0.07	0.11	0.06	0.00	0.13	-0.03	-0.13	0.07
3-5	0.02	-0.07	0.10	0.05	-0.01	0.11	-0.02	-0.11	0.07
GE 6	0.01	-0.09	0.10	0.06	-0.01	0.13	-0.08	-0.18	0.03
Parent Characteristics									
Parents' Average Age (5-year increments)[a]	-0.07	-0.09	-0.05	-0.01	-0.02	0.01	-0.02	-0.04	0.00
Maternal Educational Status[c]									
Less than high-school graduate	-0.11	-0.34	0.13	0.01	-0.15	0.17	0.10	-0.15	0.34
High school graduate	Reference			Reference			Reference		
Technical school	0.02	-0.07	0.12	0.02	-0.04	0.09	0.10	0.00	0.20
College	0.04	-0.02	0.11	0.06	0.01	0.10	0.03	-0.04	0.10
Number of Children in Household[a]	0.01	-0.01	0.04	0.00	-0.02	0.02	0.01	-0.02	0.03
Hours Per Week Parents Worked On Own Operation[a]									
0 hours	0.48	0.01	0.95	-0.02	-0.35	0.31	-0.29	-0.79	0.21
1 to 10 hours	-0.02	-0.15	0.10	-0.09	-0.17	0.00	0.01	-0.12	0.13
11 to 30 hours	0.01	-0.07	0.08	-0.03	-0.08	0.03	-0.01	-0.09	0.07
31 to 40 hours	-0.02	-0.10	0.07	-0.01	-0.07	0.05	-0.01	-0.10	0.08
41 to 60 hours	Reference			Reference			Reference		
60+ hours	-0.11	-0.22	-0.01	0.02	-0.06	0.09	-0.07	-0.19	0.04

Table 3 - continued. Characteristics Associated with Parents' Safety Beliefs (Results of Multivariable Linear Regression)

Safety Beliefs	Monitoring β (95% Confidence Interval)			Task Readiness: Maturity/Skill Important β (95% Confidence Interval)			Task Readiness: Age/Size Important β (95% Confidence Interval)		
Strictness[f]									
Not – Somewhat	----		----	-0.25	-0.32	-0.17	-0.20	-0.32	-0.09
Moderate	----		----	-0.11	-0.16	-0.05	-0.07	-0.16	0.01
Very	----		----	Reference			Reference		
Task Readiness: Maturity/Skills[a]	0.20	0.14	0.25	----		----	0.36	0.30	0.42
Task Readiness: Age/Size[a]	0.07	0.03	0.10	0.16	0.13	0.18	----		----

[a]Less than 5% of the data were missing.

[b]Data on self-control were missing for 12.5% of the cases and 19.1% of the controls.

[c] Data on size-for-age were missing for 4.5% of the cases and 8.5% of the controls.

[d]Data on BMI-for-age were missing for 3.8% of the cases and 8.3% of the controls.

[e]Maternal education data were missing for 3.8% of the cases and 6.5% of the controls.

[f]Data on monitoring were missing for 5.4% of the cases and 9.5% of the controls.

[g]Separate multivariable linear regression analyses were performed for each covariate, for each safety belief. The statistical models were adjusted for case-control status and the following covariates:

Gender – adjusted for: missing values, non-response, year participated, age, parents' age, maternal education, children in household, hours parents worked.

Child's age – adjusted for: missing values, non-response, year participated, gender, parents' age and hours worked, maternal education, children in household.

Self-control – adjusted for: missing values, non-response, year participated, gender, age, parents' age and hours worked, maternal education, household children.

Short-for-age–adjusted for: missing values, non-response, year participated, gender, age, parents' age and hours worked, maternal education, household children.

Body-mass index (BMI)-for-age – adjusted for: missing values, non-response, year participated, gender, age, parents' age, maternal education, children in household, hours per week parents worked.

Prior child injuries – adjusted for: missing values, non-response, year participated, gender, age, BMI, short, self-control, parents' age, maternal education, children in household, hours per week parents worked, prior injuries to household members.

Year participated – adjusted for: missing values, non-response, age, gender.

Parents' age – adjusted for: non-response, year participated.

Maternal education – adjusted for: missing values, non-response, year participated, parents' age, hours per week parents worked, children in household.

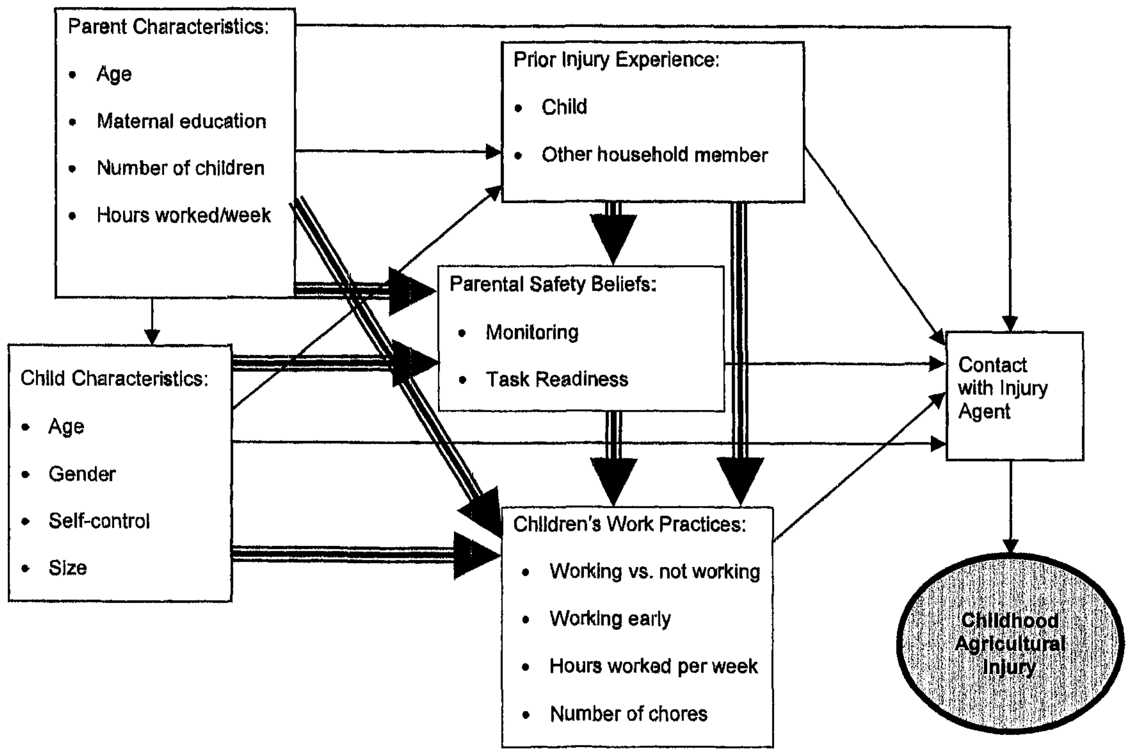
Children in household – adjusted for: missing values, non-response, year participated, parents' age, maternal education, hours per week parents worked.

Hours per week parents worked – adjusted for: missing values, non-response, year participated, parents' age, maternal education, children in household.

Prior injuries to household members – adjusted for: missing values, non-response, year participated, age, gender, BMI, short, self-control, prior child injuries, parents' age, maternal education, children in household, hours per week parents worked.

Figure 1. Conceptual Model – Parental Safety Beliefs and Childhood Agricultural Injury

Thick triple line = Effect of variable at arrow head is modified by the variable at the arrow tail
Note: Year of participation (1999/2001) is included in all statistical models but is not shown here.



CHAPTER VI

DISCUSSION

In agricultural families, children participate in the activities of other family members and are expected to do their share of work related to agricultural production (Elder and Conger, 2000). Family-run agricultural operations are exempt from federal labor standards, and most are exempt from federal safety standards, leaving parents responsible for monitoring children's exposures to agricultural hazards and ensuring their safety. Despite their pivotal role, research on parental determinants of childhood agricultural injury is lacking. Although parents accept their responsibility in preventing childhood injury (Peterson et al., 1987) and farming/ranching parents have been found to be motivated to protect their children (Elkind, 1993), the developmental and economic benefits of children's work are thought to outweigh the risks incurred through exposure to agricultural hazards (Elkind, 1993; Kelsey, 1994; Pickett et al., 2003; Zentner et al., 2005). The risks of childhood agricultural injury associated with children's work practices are infrequently reported, and it is not clear that the risks children encounter by working on family operations are accurately perceived. The exemptions of family operations from federal standards and the development of national agricultural work guidelines suggest that relatively safe levels of work are assumed to exist (Lee and Marlenga, 1999). This study examined the associations between the risk of childhood agricultural injury and two parenting factors: parents' safety beliefs and children's agricultural work practices, or parental chore assignment.

Parents' Safety Beliefs

From a developmental perspective, one of the primary sources of control for unintentional injuries to young children is their parents (Peterson and Stern, 1997). However, associations between parenting processes and childhood agricultural injury have had limited research. In the current study, most parents monitored their children very strictly and believed their children's cognitive (maturity/skills) and physical (age/size) readiness were very important in deciding whether the children should perform new agricultural chores. This is the first prevalence data that have been reported for these factors in this Midwestern agricultural population.

In multivariate logistic regression analyses, the parental safety beliefs examined in this study (monitoring, cognitive readiness, and physical readiness) were associated with reduced risks of childhood agricultural injury. In addition to the multivariate analyses, sensitivity analyses were conducted to assess the impact of (a) unmeasured confounding by a factor such as differential hazardousness of the task/environment that may have been associated with parental monitoring levels and an increased likelihood of childhood agricultural injury and (b) missing data on the association between strict monitoring and childhood agricultural injury. The sensitivity analyses results were supportive of the original analysis.

Limited research exists on the quality and quantity of supervision in occupational settings, particularly for youth performing agricultural work or playing near agricultural work areas. In a review of coroners' files and hospital discharge data for a five-year period ending March 31, 1990, childhood agricultural injury risk was associated with inadequate supervision of young farm children, allowing children to be in the area of moving or unguarded machinery, and allowing children to accompany workers using agricultural machinery (Pickett et al., 1995). In an Iowa survey of children's exposures to agricultural hazards, 30% of children over age three were unsupervised while playing alone in work areas and 40% of children operating agricultural equipment did so without supervision (Hawk et al., 1991). In a 1993 descriptive analyses of supervision of 22 Iowa farm children, younger than 10 years old, older siblings were found to often supervise the children (31% of the injured cases); in addition, almost 79% of parents were occupied with agricultural activities at the time of the child's injury (Sebille et al., 1997).

In the current study, increased monitoring was expected to be associated with decreased injury. The decreased risk of injury observed for children who were moderately monitored, compared to those strictly monitored, was not expected but is potentially explained by: (a) "strict monitoring" being an indicator of a child's high-risk behavior or an agricultural operation's high-risk exposures, justifying increased monitoring; (b) parents who more vigilantly monitor their children may also more vigilantly report injury incidents; (c) parents of children who have incurred an injury may more vigilantly monitor their children because of the injury or they may be more sensitive to the social desirability of reporting more monitoring; or, (d) children who are strictly monitored or parents who strictly monitor may have increased confidence about their own/their child's performance of high-risk chores (i.e., the child may be more monitored but also more likely to perform hazardous chores).

Morrongiello and others (Morrongiello and House, 2003; Morrongiello et al., 2004a, 2004b; Morrongiello, 2005), have conceptualized and measured supervision and assessed its association with injury risk, in general. Inadequate parental supervision has been associated with children's injuries (Morrongiello et al., 2004a, 2004b; Morrongiello, 2005), but physical proximity has been found to be the only behavior directly related to injury risk (Morrongiello and House, 2003). General patterns or parenting styles may be better predictors of a child's well-being than specific parenting practices (Morrongiello, 2005); and parental attitudes, beliefs, and values, such as protectiveness, worry about children's safety, and confidence about being able to keep a child safe are associated with both supervisory behaviors and decreased risk of injury (Morrongiello and House, 2003; Morrongiello, 2005). Underlying attributes, such as parental conscientiousness (e.g., being well organized, having high standards, always striving to achieve goals) are also found to be related to children's risk-taking and injury history, but not to parental supervisory behaviors (Morrongiello, 2005). This suggests that parents may provide "scaffolding" during periods of developmental vulnerability (Masten, in press) that includes non-supervisory processes for reducing childhood injury risk such as modifying the environment, mentoring children's work practices for longer periods, or teaching them safety-related beliefs, attitudes, or behaviors.

Children's Work Practices

In the current study, the majority of the respondents reported performing agricultural work (88% of the cases and 60% of the controls), but fewer youth reported chore assignments commonly associated with minimal risk: 26% of the cases and 22% of the controls performed work that was developmentally appropriate, 40% of the cases and 35% of the controls worked one to ten hours per week on the agricultural operation, and 11% of the cases and 9% of the controls performed one type of chore per month.

Although work practices are recognized as determinants of occupational injury and "hours worked" are commonly used to approximate duration of occupational exposure, the associations between work practices and childhood agricultural injury, other than "work hours per week," are infrequently examined. In a matched analysis of case-control data, work hours were associated with an increased risk of work-related agricultural injuries (Elkington, 1990). Gerberich et al. (2001) observed that injury rates increased from 737 to 5,357 per 100,000 persons as the average number of agricultural-work hours per week increased from less than 10 to 40+ hours and that, compared to those working less than 10 hours per week, the corresponding rate ratios increased from 3.5 to 7.6 with increasing hours worked per week. Stueland et al. (1996) reported an increased risk of injury for every hour worked per week (OR = 1.05) among children less than 18 years old. Sprince et al. (2003), reported an increased risk of work-related agricultural injury for adults working at least 50 hours per week (OR = 1.65; 95% CI = 1.23-2.21); they also found that, for adults, part-time work on the agricultural operation and at least 12 weeks of off-operation work in the past year were protective from agricultural injury (OR = 0.57; 95% CI = 0.32-0.98 and OR = 0.69; 95% CI = 0.48-0.99, respectively). Increased work hours were also found to increase the risk of injury for specific activities performed by workers aged five years of age or older; hours per week spent milking (1-10, 11-20, 21-30, 31-63) were found to be associated with dairy cattle-related injuries (resulting in rate ratios of 1.0, 2.3, 5.5, and 20.6, respectively) (Boyle, 1995; Boyle et al., 1997), and increased rate ratios for tractor-related (Lee et al., 1996) and machinery-related (Gerberich et al., 1998) injuries were observed for working more than 20 hours per week, compared to 19 hours or less.

In addition to duration of exposure, the number of tasks a child performs may be a risk factor for agricultural injury. In a Minnesota study of adolescent workers, Parker et al. (1994) found that self-report of occupational injury was positively associated with high school-aged workers engaging in one, two, and three job activities, even after adjusting for the total number of hours worked. In general, injury rates are found to be higher for tasks that are non-repetitive and unpredictable (Saair, 1977), key characteristics of an agricultural workload. For example, farmers in Sweden were found to use 40 different types of machines and equipment (Jansson, 1992), not accounting for the varying geographic, climatic, temporal, lighting, and structural conditions under which agricultural tasks are performed. In a qualitative study of stress and risk of agricultural injury, farmers themselves identified excessive workload (including number of roles performed by an individual, task complexity, and lack of time) and economic stressors as primary determinants of safety hazards and behaviors (Kidd et al., 1996).

Using multivariate logistic regression analyses, the current study found children's work practices to be associated with increased risk of childhood agricultural injury. Decreased risks were observed for non-working children, compared to children performing what would be considered the "least risky" levels of agricultural work. In addition to the multivariate analyses, sensitivity analyses were conducted to assess the impact of (a) unmeasured confounding, such as differences due to differential task supervision or training that may be associated with both the developmental appropriateness of assigned work and childhood agricultural injury, (b) exposure misclassification, and (c) missing data on the association between working early and childhood agricultural injury. For the sensitivity analyses, working early was recoded into a dichotomous variable: "was the task performed developmentally appropriate? (yes/no)." Sensitivity analyses results were supportive of the finding that developmentally appropriate work was protective of childhood agricultural injury.

This study is the first to use population-based case-control data to evaluate the risk of agricultural injury associated with the developmental requirements of a task exceeding the developmental readiness of a child. Performing tasks that were developmentally inappropriate ("early") was associated with a higher risk of injury than observed for work practice exposures such as the number of hours a child worked or the number of types of chores they performed. The observed association supports the protective effect recently found for the dissemination of NAGCAT guidelines (Gadomski et al., 2006) and earlier descriptive analyses that found age guidelines to potentially prevent a significant proportion of injuries (Marlenga et al., 2004; Mason and Earle-Richardson, 2002). Marlenga et al. (2004), additionally observed that the efficacy of the guidelines varied by injury severity: if the NAGCAT guidelines had been followed, 60% of work-related agricultural injuries, overall, 79.5% of fatalities, and 35% of restricted activity injuries were judged to have been completely preventable.

The association observed in this study may merely reflect underlying attributes, such as parental conscientiousness, being well organized, and having high standards, which have been found to be protective of children's risk-taking and injury history (Morrongiello, 2005). However, if this association is supported in future research, appropriate interventions may include increasing the age and supervision standards that currently exist or restricting children from performing some agricultural tasks altogether.

Limitations of Parents' Safety Beliefs

Monitoring, fundamentally a global measure of parental knowledge of children's whereabouts and activities, was used in this study as an indicator of parents' supervisory behavior even though the degree to which it reflects protective parenting processes, or children's actual supervision while performing occupational tasks, is unknown. The other safety beliefs examined in this study, parental ratings of the importance of physical or cognitive readiness, were used as global indicators of how conservative parents were about children performing developmentally appropriate agricultural tasks. The degree to which children's developmental status correlated with their parents' rating of the importance of physical or cognitive readiness was also unknown. The narrow range of responses for all three safety belief measures suggests that the survey items may have been too general or that the parents were pressured into providing socially desirable responses.

Lastly, these safety belief indicators are global measures and do not necessarily reflect the parenting processes in place when the childhood agricultural injury was incurred nor the safety beliefs or parenting of the adult who most consistently made caretaking decisions or work assignments for children. It is also probable that parental safety beliefs and the incurrence of childhood agricultural injuries are reciprocally determined. Future studies would ideally measure these factors to allow for a time series analyses of their associations. Despite these limitations, parental safety beliefs have not been examined for this population and the current study provides key baseline data.

Limitations of Children's Work Practices

The issues that surfaced in the measurement and analyses of children's work practices can inform future research efforts. "Working early," the exposure of primary interest in this study, had several limitations. Most fundamentally, early scores for 18 of the most common chores a child performed in a one-month period were averaged and assumed to approximate the exposure that precipitated the injury. The measure was based on age, a crude indicator of a child's "developmental readiness" for agricultural tasks, and on a level of supervision which was never measured or confirmed but was assumed to be equivalent to checking on a child every 10-30 minutes. Also, important for interpretation of the results, the majority of the referent group – children who performed work and met or exceeded the age recommendations for the tasks they engaged in – was comprised of youth between 16-19 years old (93%).

The risks inherent in "working early" and in the other work practices likely differ by type of task. The RRIS-II survey items only grossly measured "type" of task exposure, did not quantify the hazardousness or work-relatedness of the exposures or injuries, and correspondence to the NAGACT guidelines was limited. Additionally, the correlation between the work practice measures examined (working at all, working "early," hours worked per week, number of types of chores performed per month) and the risks inherent in the work performed at the time the agricultural injuries were incurred is unknown. Despite these limitations, because children's agricultural work practices are infrequently examined, the current study provides a basis for further study.

Study Validity

This study was observational in nature, limiting causal interpretations; however, the population-based sampling design and the relatively small percentage of RRIS-II participants lost to follow-up enhanced the representativeness of the study population. The current study was conceptually based on the standard epidemiological model of host, agent, and environment that has framed previous agricultural injury research. Causal models for future studies should better approximate the reciprocal influence of child and parent factors that are associated with the risk of injury over time, identify potential mediators and/or moderators, determine the relative importance of various risk and protective factors, and incorporate multiple levels of influence, including industry norms and economic factors.

Important analytic parameters, such as the conceptual model, sample size and measurement model, were determined by the RRIS-II conceptual model, sample size and survey items. For example, there was limited power to detect minimum relative risks for the primary study hypotheses, i.e., a limited probability that the results of a significance test will lead to rejection of the null hypotheses when there is a true effect in the population (Kline, 1998). The *a priori* power estimates ranged from 0.04 to 0.45 for variables with associated relative risks predicted to range from 0.90 to 1.20. The insufficient power to detect relative risks was likely due to the low prevalence of risk factors and the small odds ratios with which they were associated.

A limitation of the current study was that large proportions of data were missing for several of the variables, 19%, 8%, 7%, and 6% of self-control, height, weight, and maternal education, respectively. As these were all categorical variables, missing responses were assigned their own category of "exposure level" for each variable and were used in the analyses. Because such categories potentially mix the actual levels of the variables and can yield confounded results (Rothman and Greenland, 1998, p. 208), sensitivity analyses were performed to compare the original multivariate regression results for self-control and monitoring with results when the records with missing values were deleted from the analyses and when the missing values were recoded to have extreme values.

The original multivariate odds ratios for childhood agricultural injury for levels of monitoring, compared to respondents who reported being "very strict," were 0.42 for respondents with missing values, 1.0 or respondents who reported being "not-somewhat strict," and 0.71 for respondents who reported being "moderately strict." As mentioned previously, very strict monitoring may be an indicator for a child's high-risk behaviors or the agricultural operation's high-risk exposures. The protective association observed for the missing data supports this hypothesis as data were most commonly missing for age groups for which parental monitoring were least likely to be a reaction the child's behavior; 31% of the missing were four years old or younger and 35% were 18-19 years old. Multivariate odds ratios, calculated to assess the impact of the categorization of the missing values, were similar to those originally observed. These included results for (a) excluding the monitoring responses with missing values, (b) treating the missing responses as being "not-somewhat" strict, and (c) treated the missing responses as "moderately" strict. Although the multivariate odds ratio observed when the missing responses were treated as "very strict" was 0.74 and the 95% confidence interval was 0.54-1.02, this is suggestive of a protective effect.

Because the survey items that were summed to make the self-control scale were not asked of children aged five years and younger, this age group comprised 90.2% of the respondents with missing self-control data; 15-19 year olds comprised another five percent. The original multivariate odds ratios for childhood agricultural injury for self-control levels compared to children who "almost always" exhibited self-control were 1.9 for children who "almost never" exhibited self-control, 0.5 for children who "sometimes" exhibited self-control, and 1.3 for children who "almost always" exhibited self-control. Similar results were observed for multivariate regressions that (a) excluded the self-control responses with missing values and (b) excluded all respondents less than six years old and treated the missing responses as "almost always" exhibiting self-control.

Specification Bias

Specification bias results from incorrectly specifying the sampling model or structural model. This study primarily used logistic regression for data analyses, which assumes sampling from a binomial distribution and a multiplicative structural model. This study also used linear regression to examine the associations between child- and adult-related risk factors and the safety beliefs and work practices exposures, used as dependent variables. Linear regression assumes homoscedasticity and a normal distribution of the dependent variable (Y) for any independent variable (X). If these assumptions were not valid, the study results could be invalid as well.

Selection Bias

Selection bias exists when the cases and/or controls participating in a study have a different exposure-disease relationship than the cases and/or controls theoretically eligible to participate, so that the observed associations represent determinants of both participation and disease (Rothman and Greenland, 1998, p. 119). In the current study, weighting factors were calculated and used in the multivariate regressions analyses to adjust for two types of selection bias. Adjustments for non-response in the presence of unknown eligibility among non-respondents were made by inversely weighting observed responses with probabilities of response (Horvitz and Thompson, 1952), estimated as a function of characteristics available from the NASS Master List-Frame of Agricultural Operations (state, type of operation, and annual revenue by quintile), and adjusted for the estimated probability of eligibility among the sample members with the same characteristics (Mongin, 2001). The population-based sampling design and the relatively small percentage of RRIS-II participants lost to follow-up further enhanced the representativeness of the study population.

Information Bias

Information bias results from errors in measurement or classification of study variables once the subjects have been identified. It was possible that cases in this study provided better exposure information (differential recall) because of having an injury event to which exposures could be related; this may not have been true for controls, who were asked to recall exposures during a particular month without having a specific reference event. Recall bias was minimized by sending packets to study households enabling events to be recorded over the six-month period between interviews, limiting recall of injury events to the previous six months (Gerberich et al., 1990; Braun et al., 1994; Gabel et al., 2000) and recall of exposures to a one month period within the previous year (Lee et al., 1999).

As reliable and valid instruments or methods to measure the developmental appropriateness of children's agricultural work and parental safety beliefs do not exist, measurement error was likely in this novel attempt to analyze these constructs. Measurement error could have contributed to the lack of association observed between work practices and parental safety beliefs and for the non-significance of the product terms assessing modification of the association between safety beliefs and agricultural injury. Exposure misclassification sensitivity analyses were conducted to estimate the extent of potential bias from misclassification of performing developmentally appropriate work. The unadjusted odds ratio and 95% confidence interval for performing developmentally appropriate work was OR=0.71 (0.55-0.92). The levels of sensitivity and specificity were varied between 0.9 and 0.8 for cases and controls to evaluate the assumptions of exposure detection being equivalent for cases and controls or somewhat better for either the cases or the controls. Under the assumptions evaluated, performing developmentally appropriate work remained protective of childhood agricultural injury, with all but one of the misclassification-corrected odds ratio estimates ranging from 0.25 to 0.99. Under the assumption that the case sensitivity and specificity were 0.8 and 0.9 and the control sensitivity and specificity were 0.9 and 0.8 (i.e., reflecting the unlikely situation where controls were more likely to recall exposure – correctly or falsely – than cases), a corrected odds ratio of 1.18 was estimated, reversing the protective association observed for developmentally appropriate work.

Confounding

Confounding is present if reasons other than a difference in the exposure distribution account for observed differences in injury frequencies among the cases and controls. In the current study, many potential confounders of the relationship between the work practice and safety belief exposure variables and childhood agricultural injuries were not assessed. Examples include differences in children's exposure to risk due to differential hazardousness of the activity performed, supervision available, machinery/protective equipment used, environmental conditions, or the youths' previous training or experience.

Sensitivity analyses were performed to assess the magnitude and direction of potential bias from the omission of an unmeasured confounder that would increase the odds of childhood agricultural injury by factors of 5, 10, and 15, using methods described by Rothman and Greenland (1998). A range of estimates for the odds of injury, adjusted for the prevalence of an unmeasured confounder, was generated for the dichotomous measures, "very strict monitoring" and "performing developmentally appropriate work." The association observed with childhood agricultural injury for children who were strictly monitored, compared to children who were not, could have been confounded by differences in the hazardousness of the task/environment. The association observed for children who performed developmentally appropriate work versus those who worked "early" could have been confounded by differences in the degree of "scaffolding" (Masten, in press) that parents provided during periods of vulnerability due to a child's developmental changes, or to underlying parental attributes such as being well organized, conscientious, having high standards, and always striving to achieve goals (Morrongiello, 2005). The prevalence of these potential confounders among children with the exposures (P_{z1}) and those without (P_{z0}) were specified to range from 0.1 to 0.9. Because it is unclear how these potential confounders are associated with the exposures, both $P_{z1} > P_{z0}$ and $P_{z1} < P_{z0}$ were examined.

The sensitivity analyses for "very strict monitoring" were based on the 2,197 respondents with monitoring data; the unadjusted odds ratio and 95% confidence interval for strict parental monitoring was OR = 1.84, 95% CI = 0.93-1.5. Strict monitoring increased the risk of childhood agricultural injury whenever the prevalence of a potential confounder, such as the hazardousness of the task/environment, was higher among children who were not strictly monitored or when the prevalence was equal among children regardless of monitoring levels. Odds ratios as high as 3.89 were generated when potential confounding by a task/environment hazardousness factor that increased the odds of childhood agricultural injury by as little as 5 was controlled for in the analyses. The results indicated that if the prevalence of task/environment hazardousness was higher among children who were strictly monitored, the risk of childhood unintentional injury would be reduced, with odds ratios as low as 0.36, once the task/environment hazardousness was controlled for in the analyses, with a potential confounder increasing the odds of childhood agricultural injury by as little as 5. These inconsistent results support the further investigation of potential confounders of the association between parental monitoring and childhood agricultural injury and a reassessment of how best to measure monitoring.

The sensitivity analyses for developmentally appropriate work were based on the 1,444 respondents who reported work; the unadjusted odds ratio and 95% confidence interval was OR = 0.71, 95% CI = 0.55-0.92. The analyses found that, even if the confounder (inadequate scaffolding or supervision) increased the odds of childhood agricultural injury by 15, the association between performing developmentally appropriate work and childhood agricultural injury usually remained protective with odds ratios ranging from 0.12-0.95. When the prevalence of the confounder was 50%, 30%, and 10% among children who performed developmentally appropriate work versus 90%, 70% or greater, and 30% or greater, respectively, among children who did not perform developmentally appropriate work, this work could increase the odds of childhood agricultural injury, with odds ratios ranging from 1.08-4.01, once the lack of supervision was controlled for in the analyses. However, because the unmeasured confounder would need to be strong and the difference in confounder prevalence between those who did and did not perform developmentally appropriate work would have to be large to generate these results, the original results do not need reinterpreting.

Conclusions

The associations between parenting processes and the risk of unintentional injury, in general, are widely acknowledged, but their associations with childhood agricultural injury have been inadequately researched. This study is among the first to examine the risk of childhood agricultural injury associated with parents' safety beliefs and with children's agricultural work practices. Parental safety beliefs appeared protective in this population of Midwestern children living on agricultural operations, particularly for the sub-set of working aged children, 7-16 years old. Work practices were also associated with agricultural injury, increased risks were observed with increased levels of children's work practices, and decreased risks were observed for non-working children, compared to children performing what are commonly considered least risky agricultural work practices. This study is the first to use population-based case-control data to assess whether developmentally appropriate work is protective of childhood agricultural injury. Multiple pathways influencing parents' safety beliefs and decisions about children's work practices were suggested by the variation in the magnitude and direction of association between child- and parent-related risk factors and the safety beliefs and work practices modeled as dependent variables. This study was an efficient and economical way to evaluate parent- and child-level risk factors for injuries among children in Midwestern agricultural communities. It addresses a serious deficit in current knowledge about parenting-related risk factors, and its findings can guide further research and development of intervention strategies to understand and reduce this major public health problem.

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APPENDICES

APPENDIX A

HUMAN SUBJECTS' APPROVAL

Human Subjects' approval letter to be copied on this page.

APPENDIX B

RRIS-II LETTERS AND SURVEYS

The [state] Agricultural Statistics Service is collaborating with the University of Minnesota on a project that will provide information for development of prevention efforts to reduce injuries among farm/ranch household members. Your farm/ranch operation has been chosen at random from all [state] farms and ranches to participate in this project.

Within the next several weeks, a representative of our agency will call to ask for cooperation in this endeavor. *This first telephone call will take approximately five minutes.* Eligible farm/ranch households that agree to participate in the project will then be contacted after the first of July, this year, and after the first of January, next year, to complete telephone interviews. These interviews will include questions about the farming/ranching operation, persons who live on the farm/ranch, and about injuries that have occurred during the previous six-month periods; both farming/ranching and non-farming/non-ranching-related injuries are included.

To ensure complete information, it is important for all selected farms/ranches to participate whether, or not, any injuries have occurred. The enclosed letter further explains the project.

Thank you, in advance, for your participation in this important project.

Sincerely,

As you know the [state] Agricultural Statistics Service is collaborating with the University of Minnesota on a five state regional project that will provide information for development of prevention efforts to reduce injuries among farm household members. We greatly appreciate your willingness to participate in this project.

Sometime after July 1st, of this year, a representative of our agency will call to conduct an interview that will include questions about farming activities, persons who live in your farm household, and about injuries that have occurred to *any* household members between January 1st and June 30th, 2001; *both farming and non-farming-related injuries are included.*

To ensure complete information, it is important for all selected farms to participate in this interview whether, or not, any injuries have occurred. The enclosed letter further explains the project which will also include a second interview after January 1st of next year.

Thank you for your participation in this important project!

Sincerely,

As you know the [state] Agricultural Statistics Service is collaborating with the University of Minnesota on a five state regional project that will provide information for development of prevention efforts to reduce injuries among farm/ranch household members. We greatly appreciate your participation in this project that covers the two six-month periods of 2001.

Sometime *after February 1st, 2002*, a representative of our agency will call to conduct the second full interview that will include questions about farming/ranching activities, persons who live in your farm/ranch household, and about injuries that have occurred to *any* household members *between July 1st and December 31st, 2001*; *both farming/ranching injuries and injuries associated with all other types of activities are included.*

To ensure complete information, it is important for all selected farms/ranches to participate in this interview whether, or not, any injuries have occurred. The enclosed letter and packet further explains the second portion of this project.

Thank you for your continued participation in this important project!

Sincerely,

RRIS II: Agricultural Injury Surveillance

1 RO1 OH04270

Participation Interview
2001

Administered by specially trained interviewers, using a Computer-Assisted Telephone Interview (CATI) Instrument

-- Script Before Entering CATI Program –

Dial number from call sheet prepared by the USDA National Agricultural Statistics Service (NASS).

When someone answers the phone –

Ask:

"Hello, is this the >Operator__Last_Name< residence?"

If it is not the residence you are calling, follow standard NASS procedures verifying number, etc

If it's the correct household:

Ask: ***"May I please speak with the female head of household?"***

Female head of household comes to the phone (*continue interview*)

Female head of household is unavailable (*go to >callback<*)

There is no female head of household -

Ask: ***"Then, may I please speak to the male head of household?"***

Male head of household comes to the phone (*continue interview*)

Male head of household is unavailable (*go to >callback<*)

Please enter a comment that there is no female head of household, so the enumerator who places the next call will know to ask for the male head of household.

-- When an appropriate respondent (female or male head of household) has come to the phone begin the CATI interview --

>intro< "Hello, this is >EnumName< calling for the >StateName< agricultural statistics service. I am calling to follow-up on the letters sent to you by the USDA (StateName) Agricultural Statistics Service regarding a project on farm and ranch households we are conducting with the University of Minnesota. Did you receive the letters?"

1 Yes *(go to **>few_questions<**)*
3 No
9 Refusal *(go to **>reconsider6<**)*

>newletter< "Since you did not receive the letters, would you like us to send you new copies?"

1 Yes
3 No
9 Refusal *(go to **>reconsider6<**)*

>few_questions< "We'd like to ask you a few questions to see if you qualify for the project? This should only take 5 minutes. May we continue?"

1 Yes
3 No *(go to **>reconsider6<**)*

>Monitoring< "For quality control purposes, my supervisor may monitor this call."

1 *Continue*

>Obtain_Name< "With whom am I Speaking?" *[Enumerator: Who is the current respondent? Enter name.]*

____

>Who_Resp< *[Enumerator: Who is the respondent? ... Enter code.]*

1 Female head of household
3 Male head of household

>farm_qualify1< "Is this >Operator_Name<'s household? (Residence including farm families or people who live in the household.)"

1 Yes *(go to **>verify_address<**)*
3 No

>screen_4< "Does >Operator_Name< have a household associated with this operation? (Residence including farm families or people who live in the household.)"

1 Yes
3 No *(go to **>not_qual<**)*

>verify_address< "Let me verify the name and address that I have for your household.

•YID/KeyID

•Operation

•Address

•Phone

Is this information correct?"

1 Yes *(go to* ***>speak2<*****)*
3 No

>EnumInst< *[Enumerator: If Operator_name is correct, correct household address, then return through >verify_address< to >speak2<. If Operator_name is incorrect (not current), exit and return callsheet to supervisor.]*

>speak2< "Your farm or ranch was randomly selected as a potential participant in a project about farming and ranching activities and injuries that MAY occur during 2001. The results from the project will be used to develop injury prevention programs that will benefit all agricultural households. You are also eligible for a drawing for a $100 treasury bond. You are not required to participate in the project to be included in the drawing."

1 *Continue*

>speak2b< "In this short interview, we only want to ask a few questions about your operation and the ages of the people in your household, so that we can tell if you are eligible to be in the project. May we continue?"

1 Yes
3 No *(go to* ***>responses1<*****)*

>farm_qualify2< "As of January 1st, 2001, were you actively farming or ranching or did you have land in a Conservation Reserve Program (CRP)?"

1 Yes
3 No *(go to* ***>not_qual<*****)*

>active_farm1< "During the past year, did you produce or have annual sales of agricultural goods of $1,000 or more or were you involved in a Conservation Reserve Program (CRP)?"

1 Yes
3 No *(go to* ***>not_qual<*****)*

>farm_qualify3< "We need to obtain brief information on the members of your household as of JANUARY 1st, 2001. How many household members were there, including those who moved or passed away after January 1, 2001? This includes students away at college or children who reside in multiple households, including yours, etc." *[Enumerator: If respondent is uncertain, prompt them for their best estimate.]*

__ 1 – 20
98 Unknown *(go to* ***>callback<*****)*

99 Refusal *(go to **>reconsider5<**)*

>persons20< "How many persons in your household were 20 years of age or OLDER as of January 1, 2001? Remember, if someone is 20 today but their birthday was between January 1st and today, they were 19 on January 1st." *[Enumerator: If the respondent is uncertain, prompt them for their best estimate.]*

0 None
__ 1 - 12
98 Uknown *(go to **>callback<**)*
99 Refusal

>persons19< "How many persons in your household were 19 years of age or YOUNGER?"

[If respondent is uncertain, prompt them for their best estimate.]
0 None
__ 1 - 12
98 Uknown *(go to **>callback<**)*
99 Refusal

>HH_total< "Let me verify the number of household members. I have recorded a total number of >persons20< persons 20 years of age and over, and >persons19< persons 19 and under living in this household as of January 1, 2001. Is this correct?"

1 Yes
3 No *(go to **>persons20<**)*

>AnyKids< *[Programming Note: If (>persons19< = 0) go to >not_qual2<]*

>inf_consent1< "Your farm or ranch household is eligible for our project. We would appreciate your help with this project. Participation in the project WILL involve answering questions about your farm or ranch operation and about any accidents or injuries that may occur either on or off the operation through the end of December 2001."

"If you agree to take part in the project, we will be calling you back sometime after July 1st, this year, and after January 1st, of next year, to get information about your farming or ranching activities and any injuries that may have occurred during EACH six month period of 2001. Only group information, not individual information, will ever be used in any report on this project. Participation is voluntary but your cooperation would be very helpful. Whether or not you choose to participate in the project, you may enroll in the random drawing, with at least a 1 in 32 chance of receiving a $100 treasury bond. Would you be willing to help us?"

1 Yes
3 No *(go to **>reconsider2<**)*

>drawing1< "You are eligible for the drawing for a $100 treasury bond. We will notify the households that are awarded the bonds at the completion of the project. [*Sometime in 2002.*] Would you like to be included in the drawing?"

1 Yes
3 No

>final_sign_off < "Those are all the questions I have for you today. Thank you very much for agreeing to participate in this important project. In a few weeks you will receive a packet of information about the project in the mail. This will include a form on which to record any injuries that may occur during the few months before we call you again."

"On behalf of all those involved in this project, I thank you for your time and participation. We look forward to talking with you sometime after July 1st."

[Enumerator: Use CONTROL-ENTER and select EXITMODULE. Reason for exiting (1) COMPLETED INTERVIEW.*]*

>reconsider2< "Your participation will be very important in efforts to reduce farm and ranch accidents and injuries for ALL agricultural families. It is important to include ALL types of agricultural operations, whether or not there were accidents or injuries. This will help in better understanding both farming or ranching activities and injuries in your region. Would you reconsider participating?"

1 Yes *(go to **>drawing1<**)*
3 No *(go to **>drawing2<**)*

>reconsider4< "Your farm or ranch may qualify for the project. May we ask a few more questions?"

1 Yes *(go to **>active_farm1<**)*
3 No *(go to **>drawing3<**)*

>reconsider5< "This information is important to determine whether your household qualifies for the project. There are only a few more questions. May we continue?"

1 Yes *(go to **>farm_qualify3<**)*
3 No *(go to **>drawing2<**)*

>reconsider6< "Your participation in this project would make a valuable contribution. Every household we call is eligible to be included in a drawing for a $100 treasury bond. We would appreciate your help. It will only take 5 minutes. May we continue?"

1 Yes *(go to **>monitoring<**)*
3 No *(go to **>sign_off3<**)*

>responses1< *[Enumerator: If respondent doesn't volunteer a reason for their* *refusal, ask:* "Could you tell me the reason that you prefer not to participate in this interview?", *then enter the appropriate response.]*

1 We didn't (don't have) any injuries *(go to **>resp11<**)*
2 Operation too small *(go to **>resp12<**)*
3 Haven't been farming long enough *(go to **>resp13<**)*
4 Don't like surveys or Just don't want to do it *(go to **>resp14<**)*
5 I'm (we're) too busy or Don't have time *(go to **>resp15<**)*
6 (Personal Crisis) *(go to **>resp16<**)*

>resp11< "We're including ALL types of farming and ranching operations, whether or not there were accidents or injuries. May we continue?"

1 Yes *(go to **>farm_qualify2<**)*
3 No *(go to **>drawing3<**)*

>resp12< "We're including all sizes of farms and ranches. May we continue?"

1 Yes *(go to **>farm_qualify2<**)*
3 No *(go to **>drawing3<**)*

>resp13< "We're including all operations that were actively farming or ranching as of January 1st, 2001, or had land in a Conservation Reserve Program (CRP). Is this true for your operation?"

1 Yes *(go to **>reconsider4<**)*
3 No *(go to **>not_qual<**)*

>resp14< "This project is very important for the entire agricultural community. Your participation could really make a difference. There are only a few more questions. May we continue?"

1 Yes *(go to **>farm_qualify2<**)*
3 No *(go to **>drawing3<**)*

>resp15< "We understand that you are very busy. However, these questions will only take 5 minutes and your input would make a valuable contribution. May we continue?"

1 Yes *(go to **>farm_qualify2<**)*
3 No *(go to **>call_you<**)*

>call_you< "May we call you back at another time that is more convenient for you."

1 Yes *(go to **>callback<**)*
3 No *(go to **>drawing3<**)*

>resp16< "May we call you back at another time that is more convenient for you."

1 Yes *(go to **>callback<**)*
3 No *(go to **>drawing3<**)*

>not_qual< Based on the answers you have given, your farm or ranch is not eligible for our project. However, you are still eligible for the drawing for a $100 treasury bond. We will notify the households that are awarded the bonds at the completion of the project. [*Sometime in 2002.*] Would you like to be included in the drawing? *[Farms/ranches eligible for the project are operations that: had annual sales of agricultural goods of $1,000 or more or were involved in a CRP during the past year; and were actively farming/ranching as of January 1st of this year or had land in CRP; and had a farm/ranch household.]*

1 Yes
3 No

"Thank you for your time and cooperation in answering these questions. GOOD-BYE."

[Enumerator: Use CONTROL-ENTER and select EXITMODULE. Reason for exiting (3) DID NOT QUALIFY.*]*

>not_qual2< Based on the answers you have given, your farm or ranch household is not eligible for our project. However, you are still eligible for the drawing for a $100 treasury bond. We will notify the households that are awarded the bonds at the completion of the project. [*Sometime in 2002.*] Would you like to be included in the drawing? *[Farmsiranches eligible for the project* are *operations that: had annual sales of agricultural goods of $1,000 or more or were involved in a CRP during the past year; were actively farming/ranching as of January 1st of this year or had land in CRP; and had a farm/ranch household that included children).*

1 Yes
3 No

"Thank you for your time and cooperation in answering these questions. GOOD-BYE."

[Enumerator: Use CONTROL-ENTER and select EXITMODULE. Reason for exiting (3) DID NOT QUALIFY.*]*

>drawing2< You are eligible for the drawing for a $100 treasury bond. We will notify the households that are awarded the bonds at the completion of the project. [*Sometime in 2002.*] Would you like to be included in the drawing?

1 Yes *(go to **>sign_off3<**)*
3 No *(go to **>sign_off3<**)*

>drawing3< You are eligible for the drawing for a $100 treasury bond. We will notify the households that are awarded the bonds at the completion of the project. [*Sometime in 2002.*] Would you like to be included in the drawing?

1 Yes *(go to **>sign_off2<**)*
3 No *(go to **>sign_off2<**)*

>sign_off2< Thank you for your time today. Good bye. [Programming Note: If >phone< is not blank, Call new telephone number/Restart interview.]

[Enumerator: Use CONTROL-ENTER and select EXITMODULE. Reason for exiting (2) REFUSED.*]*

>sign_off3< *[Enumerator: If the respondent has already identified why he/she does not want to participate, just identify one or more of the following responses:]*

"Could you tell me the reason that you prefer not to participate in this interview?"

1 Does not want to cooperate; does not like surveys *(go to **>sign_rest<**)*
2 Too busy; refused to schedule a call-back *(go to **>sign_rest<**)*
3 Personal crisis; refused to schedule a call-back *(go to **>sign_rest<**)*
4 Other

>reason_specify< "Specify reason:"

____

>sign_rest< "Thank you for your time today. Good bye."

[Enumerator: Use CONTROL-ENTER and select EXITMODULE. Reason for exiting (2) REFUSED.*]*

>callback< [Enumerator: Setup callback to a knowledgable individual. Press CONTROL-ENTER to go to the appointment block. Remember to record the appointment on the call sheet.]

RRIS II: Agricultural Injury Surveillance

1 RO1 OH04270

First Six-Month Interview
(January 1 through June 30, 2001)

Administered by specially trained interviewers, using a Computer-Assisted Telephone Interview (CATI)

Initial Programming Note: The following variables are brought forward from the participation interview:

>Resp_type< *(1 = Female head of household; 3 = Male head of household)*
>Resp_name< *(Participation interview respondent's name)*
>persons20< *(Number of persons 20 years of age and over as of January 1, 2001)*
>persons19< *(Number of persons 19 years of age and under as of January 1, 2001)*

-- Script Before Entering CATI Program –

Dial number from call sheet prepared by the USDA National Agricultural Statistics Service (NASS).

When someone answers the phone –

Ask:

"Hello, is this the _________ residence?"

If it is not the residence you are calling, follow standard NASS procedures verifying number, etc

If it's the correct household:

Ask: ***"May I please speak with the female head of household?"***

Female head of household comes to the phone (*continue interview*)

Female head of household is unavailable (*go to >callback<*)

There is no female head of household -

Ask: ***"Then, may I please speak to the male head of household?"***

Male head of household comes to the phone (*continue interview*)

Male head of household is unavailable (*go to >callback<*)

~~**Please enter a comment that there is no female head of household, so the enumerator who places the next call will know to ask for the male head of household.**~~

-- When an appropriate respondent (female or male head of household) has come to the phone begin the CATI interview --

CATI Interview

Household Log Interview

>Who_Pi< *[Enumerator: Who is the current respondent? Enter name.]*

____

>Cur_Resp< **[Enumerator: Enter code.]**

1 Female head of household
3 Male head of household

>int_ProgNote< *[Programming Note:*
If >Cur_Resp< = >Resp_type< (from participation interview)
***>Who_Pi2<** = "you"*
***>he_she1<** = "you"*
Else
***>Who_Pi2<** =>Resp_name<*
If (>Resp_type< = 1)
***>he_she1<** = "she"*
Else
***>he_she1<** = "he"*
End If
End If]

>Intro< "Hello, this is >EnumName< calling for the >StateName< agricultural statistics service. I'm calling to follow up on a project we are conducting with the University of Minnesota about farming and ranching activities and injuries. The results from the project will be used to develop injury prevention programs that can benefit all households."

1 *Continue*

>Intrdctn< "When we spoke with >Who_Pi2< recently, >he_she1< said that you would be willing to help us with this project. We would like to conduct the full interview now, to obtain information about members of your household, your farming or ranching activities, and any injuries that may have occurred in the first six months of this year. All information we collect is confidential. If you are uncomfortable with any question, you may choose not to answer that question, and we will move on to the next question. Is this a convenient time?"

1 Yes *(go to **>cards<**)*
3 No, not a convenient time *(go to **>callback<**)*
9 Refusal *(go to **>reconsider1<**)*

>Monitoring< "For quality control purposes, my supervisor may monitor this call."

1 *Continue*

>cards< "After we spoke with >Who_Pi2<, we mailed you an interview information packet containing two letters and a set of colored cards. It would be helpful if you had the cards in front of you as we speak. Do you have them available?"

1 Yes *(go to **>HH_totalA<**)*
3 No *(go to **>getcards<**)*

>getcards< "Can you get the cards?"

1 Yes *(go to **>HH_totalA<**)*
3 No *(go to **>proceed<**)*

>proceed< "We can proceed with the interview anyway. May we continue?"

1 Yes *(go to **>HH_totalA<**)*
3 No (*go to* ***>callback<***)

>HH_totalA< "Let me verify the number of people that lived in your household as of January 1, 2001. I have:

Persons 20 years of age and over: >persons20<

Persons 19 years of age and under: >persons19<.

Is this correct?"

1 Yes *(go to **>hh_ProgNote1<**)*
3 No *(go to **>person20<**)*

>person20< "How many persons in your household were 20 years of age or OLDER as of January 1, 2001? Remember, if someone is 20 today but their birthday was between January 1st and today, they were 19 on January 1st." *[Enumerator: If the respondent is uncertain, prompt them for their best estimate.]* ____

>person19< "How many persons in your household were 19 years of age or YOUNGER?"
[If respondent is uncertain, prompt them for their best estimate.] ____

>HH_totalB< "Let me verify the number of people that lived in your household as of January 1, 2001. I have:

Persons 20 years of age and over: >person20<

Persons 19 years of age and under: >person19<.

Is this correct?"

1 Yes *(go to **>hh_ProgNote1<**)*
3 No *(go to **>person20<**)*

>hh_ProgNote1< *[Programming Note:*

If (>HH_totalA< = 3)

*>**persons20**< = >person20<*
*>**persons19**< = >person19<*
Endif
If (>persons19< = 0)
*Go to >**not_qual**<*
Else
*Go to >**enterpr1**<*
Endif]

>not_qual< "Since no one in your household was 19 years of age or younger, as of January 1, 2001, your household is not eligible for our project. However, you are still eligible for the drawing for a $100 U.S. Savings Bond (Series EE) that we told >Who_Pi2< about during our earlier conversation. Thank you for your time and cooperation. Goodbye."

1 *Continue (go to to >**hh_exit1**<)*

>enterpr1< "Between January 1 and June 30, 2001, of the following farming/ranching enterprises, which ONE required the MOST amount of WORK TIME on your operation?"

1 Beef cattle
2 Dairy cattle
3 Other animals (i.e. poultry, sheep, swine, horses, etc.)
4 Field, forage or specialty crops
5 CRP (Conservation Reserve Program) or Set-aside program
6 Other, specify___________________________
8 Unknown
9 Refused

>hh_ProgNote2< *[Programming Note: If >proceed< = 1 (go to >**hh_log**<); Else (go to >**get_gold**<)]*

>get_gold< "For the next questions it will be helpful for you to have the gold card from the packet in front of you. Do you have the gold card*?" (Wait for the respondent to get the gold card or say that it is not available.)*

1 *Continue*

>hh_log< "Now I need to collect some basic information about each member of your household. Starting with the persons 20 years of age and older (if there is one)…."

1 *Continue*

>hh_ProgNote3< *[Programming Note: Set >**kids**< = 0; >**adults**< = 0. Create array >kidmo(>persons19<,6)<, to represent the possible months for which "kids" can be either cases or controls and set all cells of the array to 0. The program then loops through the age groups. First Persons 20 and Over, person 0 thru >persons20< (>**type_pers**< = "adult" and >**adults**< = >**adults**< + 1, set >**kidno**< = 0, with ">type_pers< "#" >adults<" displayed in the upper left corner of the screen); then Persons 19 and*

*Under, person 1 thru >persons19< (increment **>kids<** = **>kids<** + 1, set **>kidno<** = >kids<, with **>type_pers<** = "child", ">type_pers< "#" >kids<" displayed in the upper left corner of the screen). As it goes through the loop, each subject is also assigned an incremental subject number **>noinfarm<**, and the total number of people in the farm household, **>totinfarm<** set to >persons20< + >persons19<.]*

>first_name< "What is their first name?" ______________________

>last_name< "What is >first_name<'s last name?" ______________________

>self_relat< "What is >first_name<'s relationship TO YOU?"

1 Self (respondent)
2 Spouse / Life partner
3 Child (son/daughter)
4 Sibling
5 Parent
6 Other family
7 Non-family
8 Unknown
9 Refused

>hh_ProgNote4< *[Programming note:*
>Was_is< *= "is"*
>Was_were< *= "was"*

If >self_relat< = 1
>Your_name's< *= "your"*
>Title< *= "you"*
>Was_were< *= "were"*
>hh_moved< ***= 1 (Yes)***
If **>HHLog_resp< = 2** ***(Female Head of Household)***
>gender< *= 3 (female)*
Else
>gender< *= 1 (male)*
Endif
Go to ***>dob<***

Else

>Your_name's< *= "****>first_name<****'s"*
>Title< *=* ***>first_name<***

Endif

Endif/

>hh_moved< "Did >first_name< live in your household as of JUNE 30, 2001?" *[Note: People on vacation on June 30, 2001 are considered to be living in the household.]*

1 Yes (*go to* ***>hh_ProgNote5a<***)
3 No (*go to* ***>hh_other<***)

>hh_other< “Did >first_name< move or pass away between January 1 and June 30, 2001?”

1 Moved – Includes those who left for school or to live in another household, whether temporarily or permanently. (*go to* ***>month_left<***)
2 Passed away *(go to* ***>hh_ProgNote5<****)*
3 Not living in Household at any time during this 6 months *(go to* ***>leadin<****)*

>hh_ProgNote5< *[Programming Note: If* ***>hh_other<*** *= 2 (deceased), set* ***>Was_is<*** *= “was”]*

>month_left< “In what month did this occur?” ____

>day_left< “On what day of the month?” ____

>leadin< “I’d like to ask you some questions about >first_name< even though he/she is not living with you now.”

1 *Continue*

>gender< “>Was_is< >first_name< male or female?”

1 Male
1 Female

>dob< “What >was_is< >Your_name’s< birthdate?”____/__/__ (YYYY/MM/DD)

>hh_ProgNote6< *[Programming note: If respondent does not know date of birth or refuses to give it, go to* ***>current<****; Else go to* ***>hh_ProgNote6a<****]*

>current< “What was >his_her< age on January 1, 2001?” __ Years

>hh_ProgNote6a< [Programming Note:
If (>type_pers< = “child”)
  >kid_num< = >kids<
Else
  >kid_num< = 99
End If
If (>dob< known)
    >age< = trunc((((01/01/2001) - >dob<])/365.25),0)
Else
    >age< = >current<
End If

>hh_ProgNote6b< [Programming Note:: If **>self_relat<** = 1 and **>age<** < 18, print the following error message and schedule a callback to an adult. Error message:]

"Warning – According to the relationship and birthdate/age information you have entered the person you are interviewing is too young! Please correct this information if it is in error, or explain that we cannot interview individuals who were under 18 years of age (as of January 1st) without prior parental permission and schedule a callback." *(go to **>dob<**)*

>hh_ProgNote6c< [Programming Note:: Don't collect information on individuals born after January 1st, 2001: If >age< < 0 (born in 2001), verify **>dob<**. If birthdate is before 01/01/2001 go to **>race<**, ELSE go to **>hh_next_member<**.]]

>race< "What >was_is< >Your_name's< race?)" *[Enumerator: Read list and enter ALL that apply]*

1 White
2 Black or African American
3 American Indian or Alaskan Native
4 Hispanic or Latino
5 Asian
6 Native Hawaiian or Pacific Islander
7 Something else
8 Unknown
9 Refused

>hh_ProgNote7< *[Programming note: If any of the codes entered in >race< is 7, go to **>race_specify<**; else go to **>hh_ProgNote8<**]*

>race_specify< "Please specify the other race." ____________________

>hh_ProgNote8< *[Programming note:*

If (>hh_other< = 3)
*Go to **<hh_next_member<***
Elseif (>age< < 16)
*Go to **>insurance<***
Endif]

>married< "As of January 1, 2001, what was >Your_name's< marital status?"

1 Married or living as married
2 Never married
3 Separated
4 Divorced
5 Widowed
8 Unknown
9 Refused

>insurance< "From January 1, 2001 through June 30, 2001, >was_were< >Title< covered by any type of health or medical insurance, including Medicare or Medicaid?"

1 Yes, all of that time *(go to **>type_ins<**)*
3 Yes, part of that time *(go to **>type_ins<**)*
5 No, none of that time *(go to **>yrs_school<**)*
8 Unknown *(go to **>yrs_school<**)*
9 Refused *(go to **>yrs_school<**)*

>type_ins< "Under which of the following types >was_were< >Title< covered?" *[Enumerator: Read list and enter ALL that apply.]*

1	Employer provided (paid) medical plan	5	Medicaid
2	Household provided (paid) medical plan	6	Something else
3	Medicare with a supplemental policy	8	Unknown
4	Medicare without a supplemental policy	9	Refused

>hh_ProgNote9< *[Programming note: If any of the codes entered in >type_ins< is 6, go to **>type_ins_specify<**; else go to **>hh_ProgNote10<**]*

>type_ins_specify< "Please specify the other insurance."

____

>hh_ProgNote10< *[Programming note: If household member you're asking about is < 5 years of age, go to **>mo_farmwork6<**]*

>yrs_school< "As of January 1, 2001, what was the highest grade in school >Title< completed?"

0 Less than kindergarten (includes pre-school & no school) *(go to **>mo_farmwork6<**)*
1 Eighth grade or less (includes kindergarten) *(go to **>mo_farmwork6<**)*
2 Some high school *(go to **>mo_farmwork6<**)*
3 High school graduate or GED *(go to **>mo_farmwork6<**)*
4 Some technical school *(go to **>mo_farmwork6<**)*
5 Technical school graduate *(go to **>mo_farmwork6<**)*
6 Some college *(go to **>mo_farmwork6<**)*
7 College graduate *(go to **>mo_farmwork6<**)*
8 Post graduate/Professional school (graduate school, medicine, law, etc.) *(go to **>mo_farmwork6<**)*
9 Other *(go to **>yrs_school_specify<**)*
98 Unknown *(go to **>mo_farmwork6<**)*
99 Refused *(go to **>mo_farmwork6<**)*

>yrs_school_specify< "Please specify the other schooling."

____

>mo_farmwork6< "Between January 1, 2001 and June 30, 2001, how many months did >Title< work or do chores in any activity related to your farming or ranching operation?"

0 None *(go to **>hh_next_member<**)*
___ 1 – 6 months
8 Unknown
9 Refused

>hrs_farmwork6< "On average, how many HOURS PER WEEK?"

___ 1 – 130 hours

998 Unknown
999 Refused

>hh_next_member< *[Programming note: Remove individuals < 20 as possible controls for month when they were not in residence:*

If (>type_pers< = "child")
If (>hh_other< = 3)
I=1,6: ***>kidmo(>kids<,i)<*** *= 9*
Elseif (>month_left< ge 1 and >month_left< < 6)
I=>month_left<+1,6: ***>kidmo(>kids<,i)<*** *= 9 Endif*

Then, if no more HH members remain - go to ***>cards2c<*** *else* ***continue]***

"Now, let's talk about the next member of your household."

1 *go to* ***>hh_ProgNote3<***

>reconsider1< "May I ask why you prefer not to continue at this time?"

1 Operation too small *(go to* ***>reconsider3<****)*
2 Didn't have any injuries *(go to* ***>reconsider2<****)*
3 Haven't been farming long enough *(go to* ***>reconsider3<****)*
4 Not a convenient time – Too busy (*go to* ***>callback<***)
5 Personal crisis (*go to* ***>callback<***)
6 Does not want to cooperate (Doesn't like surveys) – Just not interested *(go to* ***>reconsider3<****)*

>reconsider2< "Your participation will be very important in efforts to reduce farming and ranching accidents and injuries for ALL farm families. It is important to include ALL types of operations, whether or not there were accidents or injuries. This will help in better understanding both farming and ranching activities, and injuries in your region. Would you reconsider participating?"

1 Yes *(go to* ***>cards<****)*
3 Not a convenient time – Too busy (*go to* ***>callback<***)
5 No, don't want to participate *(go to* ***>abbrev1<****)*

>reconsider3< "The results of this project will be used to develop effective injury prevention programs that can benefit all farming and ranching households. When we spoke with >Who_Pi2< earlier >he_she1< agreed to participate in the project. Your participation is very important. Would you please reconsider?"

1 Yes *(go to* ***>cards<****)*
3 Not a convenient time – Too busy (*go to* ***>callback<***)
5 No, don't want to participate *(go to* ***>abbrev1<****)*

>abbrev1< "In that case, would you consider answering a few brief questions about the members of your household and any injuries that occurred between January 1, and June 30, 2001?"

1 Yes *(go to* ***>ab_acres<****)*
3 No *(go to* ***>hh_end1<****)*

Abbreviated Interview

>ab_acres< "The first set of questions are about YOUR farming or ranching operation.

Between January 1st, 2001 and June 30th, 2001, of the acres that you own, plus the acres that you rent or lease, how many did you have in use or active production, including land in hay and pasture? Do not include wasteland, woodlands, or land in long-term CRP (Conservation Reserve Programs) or any set-aside programs."

0-99,999 acres *[Enumerator: Note - If >0 & <1, code as 1]*

>ab_enterpr< "During that time, of the following farming/ranching enterprises, which ONE required the most amount of WORK TIME on your operation?"
[Enumerator: Read list of possible answers.]

1 Beef cattle *(go to **>ab_HH_totalA<**)*
2 Dairy cattle *(go to **>ab_HH_totalA<**)*
3 Other animals (i.e. poultry, sheep, swine, horses, etc.) *(go to **>ab_HH_totalA<**)*
4 Field, forage or specialty crops *(go to **>ab_HH_totalA<**)*
5 CRP (Conservation Reserve Program) or Set-aside program *(go to **>ab_HH_totalA<**)*
6 Other *(go to **>ab_enterpr_specify<**)*
8 Unknown *(go to **>ab_HH_totalA<**)*
9 Refused *(go to **>ab_HH_totalA<**)*

>ab_enterpr_specify< "Please specify other enterprise." ____________________

>ab_HH_totalA< "Let me verify the number of people that lived in your household as of January 1, 2001. I have:

Persons 20 years of age and over: >persons20<

Persons 19 years of age and under: >persons19<.

Is this correct?"

1 Yes *(go to **>ab_ProgNote1<**)*
3 No *(go to **>ab_person20<**)*

>ab_person20< "How many persons in your household were 20 years of age or OLDER as of January 1, 2001? Remember, if someone is 20 today but their birthday was between January 1st and today, they were 19 on January 1st." *[Enumerator: If the respondent is uncertain, prompt them for their best estimate.]* ____

>ab_person19< "How many persons in your household were 19 years of age or YOUNGER?"
[If respondent is uncertain, prompt them for their best estimate.] ____

>ab_HH_totalB< "Let me verify the number of people that lived in your household as of January 1, 2001. I have:

Persons 20 years of age and over: >ab_person20<

Persons 19 years of age and under: >ab_person19<.

Is this correct?"

1 Yes *(go to **>ab_ProgNote1<**)*

3 No *(go to **>ab_person20<**)*

>ab_ProgNote1< *[Programming Note:*

If (>ab_HH_totalA< = 3)
  ***>persons20<** = >ab_person20<*
  ***>persons19<** = >ab_person19<*
Endif
If (>persons19< = 0)
  *Go to **>ab_not_qual<***
Else
  *Go to **>ab_farminja<***
Endif]

>ab_not_qual< "Since no one in your household was 19 years of age or younger, as of January 1, 2001, your household is not eligible for our project. However, you are still eligible for the drawing for a $100 U.S. Savings Bond (Series EE) that we told >Who_Pi2< about during our earlier conversation. Thank you for your time and cooperation. Goodbye."

1 *Continue to **>ab_exit1<***

>ab_farminja< "Next I will be asking a few questions about each member of your household and any injury events they may have experienced. By injury we mean any accident or injury event that:

[READ SLOWLY!!]

- Restricted normal activities for at least 4 hours;

AND/OR

- Resulted in loss of consciousness, loss of awareness, or amnesia for any length of time;

AND/OR"

1 *Continue*

>ab_farminjb< "• Required professional health care, including doctors, nurses, chiropractors, dentists, or other health care professionals.

This includes accidents or injuries that:

1) Happened ON OR OFF THE FARM OR RANCH; and

2) Were minor, serious or fatal."

1 *Continue*

>ab_farminjc< "Some examples of injuries include:

- A twisted ankle or broken leg;
- Briefly passing out while pouring chemicals;
- An animal bite or kick;
- A blow to the head or other part of the body."

1 *Continue*

>ab_farminj< "Thinking about the time between January 1st and June 30th, 2001, did any member of your household have any accidents or injuries in any way related to YOUR farming or ranching operation? This includes activities such as transportation on roadways, or any other aspect of your operation, including raising animals for recreation or home use. It could also include someone who was injured while standing or playing in an area where these activities were taking place."

1 Yes
3 No
8 Unknown
9 Refusal

>ab_non_farminj< "During that time, did any member of your household have any accidents or injuries related to activities OTHER THAN farming or ranching?"

1 Yes
3 No
8 Unknown
9 Refusal

>ab_ProgNote2< *[Programming note: If **>ab_farminj<** = 3 (no) and **>ab_non_farminj<** = 3 (no), go to **>ab_end2<**]*

>ab_ProgNote3< *[Programming Note: The program loops through the age groups. First Persons 20 and Over, person 0 thru >persons20< (**>type_pers<** = "adult" and **>adults<** = **>adults<** + 1, with ">type_pers< "#" >adults<" displayed in the upper left corner of the screen); then Persons 19 and Under, person 1 thru >persons19< (increment **>kids<** = **>kids<** + 1, with **>type_pers<** = "child", ">type_pers< "#" >kids<" displayed in the upper left corner of the screen. If male, **>he_she<** = "he", **>his_her<** = "his"; else if female, **>he_she<** = "she", **>his_her<** = "her".]*

>ab_hh_log< "Now I need to collect some basic information about each member of your household. Starting with the persons 20 years of age and older (if there is one)…."

1 *Continue*

>gender< "Is" >type_pers< "#" >adults< (or >type_pers< "#" >kids<, from upper left corner of the screen) "male or female?"

1 Male
2 Female

>ab_ProgNote3a< *[Programming Note:*

If (>gender< = 1 (male)
*>**he_she**< = "he"*
*>**his_her**< = "his"*
Else if (>gender< = 2 (female)
*>**he_she**< = "she"*
*>**his_her**< = "her"*
Endif]

>ab_age< "What was >his_her< age as of January 1, 2001?" __ Years. *[Enumerator: If <1, enter 0.]*

>ab_ProgNote4< *[Programming Note: If >ab_farminj< = 3 (no), go to **>ab_ProgNote5<**.]*

>ab_farm< "Between January 1st and June 30th, 2001, did >he_she< have any accidents or injuries related to YOUR operation?"

1 Yes
3 No *(go to**>ab_ProgNote5<**)*
8 Unknown *(go to **>ab_ProgNote5<**)*
9 Refused *(go to **>ab_ProgNote5<**)*

>ab_num1< "How many?"

__ 1-9
98 Unknown
99 Refused

>ab_wk6< "During those months, how many months did >he_she< work or do chores in any activity related to your farming or ranching operation?"

0 None *(go to **>ab_ProgNote5<**)*
___ 1 – 6 months
8 Unknown *(go to **>ab_ProgNote5<**)*
9 Refused *(go to **>ab_ProgNote5<**)*

>ab_hr6< "On average, how many HOURS PER WEEK?"

____ 1-130 hr/wk
998 Unknown
999 Refused

>ab_ProgNote5< *[Programming Note: If >ab_non_farminj< = 3 (no), go to **>ab_next_member<**.]*

>ab_nonfarm< "During those months did >he_she< have any accidents or injuries related to activities OTHER THAN farming or ranching?"

1 Yes
3 No *(go to **>ab_next_member<**)*
8 Unknown *(go to **>ab_next_member <**)*
9 Refused *(go to **>ab_next_member <**)*

>ab_num2< "How many?"

__ 1-9
98 Unknown
99 Refused

>ab_next_member< *[Programming note: If no more HH members remain - go to **>ab_end2<**; else **continue**]*

"Now, let's talk about the next member of your household."

*1 go to **>ab_ProgNote3<***

Injury Section

>i_ProgNote0< *[Programming Note: Carry forward: >persons19< and Array >kidmo(>persons19<,6)<; Set:*

>finj_kids< = 0 (# children with injuries associated with their farming/ranching operation)
Loop j = 1, >persons19<
>no_f_inj(j)< = 0 (# injuries assoc with their farming/ranching operation, for each child)
Continue

>cards2c< "The light blue card in your packet also defines what we mean by INJURY and will be helpful for the next few questions. Do you have the packet in front of you?"

1 Yes *(go to **>cards2a<**)*
3 No

>getcard< "Can you get the card?"

1 Yes
3 No

>cards2a< "The next questions are about accidents and injuries that occurred TO MEMBERS OF YOUR HOUSEHOLD BETWEEN JANUARY 1st AND JUNE 30th OF THIS YEAR. These may have resulted from activities related to farming or ranching, AS WELL AS from other activities NOT related to farming or ranching."

"The injured person could have been directly involved in the activities or simply standing or playing in the area. These accidents and injuries INCLUDE MINOR AS WELL AS SERIOUS AND FATAL ACCIDENTS OR INJURIES that:"

1 *Continue*

>card2b< *[Enumerator: Read slowly!!]*

- **"Restricted normal activities for at least 4 hours;**

  AND/OR

- **Resulted in loss of consciousness, loss of awareness, or amnesia for any length of time;**

  AND/OR

- **Required professional healthcare, including care by doctors, nurses, chiropractors, dentists or other healthcare professionals."**

1 Continue

>i_ProgNote1< *[Programming Note: If >cards2c< = 1 (yes) or >getcard< = 1 (yes) go to **>questions<**, else, go to **>nocard1<**.]*

>nocard1< "Let me give you a few examples of the types of injuries we're interested in. These include:

- A brain injury or loss of consciousness resulting from a fall;
- A broken arm from working with machinery;
- An animal bite or kick;
- A brief loss of consciousness after breathing toxic gas such as silo gas or manure pit gas;
- A burn or blister due to heat or chemical contact;"

1 *Continue*

>nocard2<

- "Abdominal injuries resulting from a motor vehicle crash;
- A leg fracture from a sports or recreation activity;
- A strained/pulled back from lifting, twisting, etc.;
- A cut or laceration from working with a tool;
- A bruise or contusion from a falling item or being struck by or against equipment or an animal."

"Do you have questions about the type of injuries we're interested in?"

1 Yes *[Enumeratror: Answer questions and repeat description, as necessary, then go to **>i_next_member<**]*
3 No *(go to **>i_next_member<**)*

>questions< "Do you have any questions about the types of injuries we're interested in?"

1 Yes *(go to **>nocard1<**)*
3 No

>i_next_member< *[Programming Note: The program loops through the study subjects , for*

>noinfarm< = 1 to >totinfarm<; Then go to ***>e_ProgNote1<****. Identifiers carried forward for each member from the Household Log are* >first_name<, >self_relat<, >hh_other<, >gender<, >kidno<, and >age<*]*

>i_ProgNote1a< *[Programming Note:*

If (>age< < 0 (born after 01/01/2001))
Go to ***>i_next_member<***
Else if (**>self_relat<** = 1)
>Your_name's< *= "your"*
>Title< *= "you"* ***(Always inserting >first_name<)***
>Was_were< *= "were"*
>He_she< *= "you"* ***(Always inserting "he" "she")***
>Are_is< *= "Are"*
>Have_has< *= "have"*
>His_her< *= "your"*
Else
>Your_name's< *= ">first_name<s"*
>Title< *= >first_name<*
>Was_were< *= "was"*
>Are_is< *= "Is"*
>Have_has< *= "has"*
If (>gender< = 1)
>He_she< *= "he"*
>His_her< *= "his"*
Else if (>gender< = 3)
>He_she< *= "she"*
>His_her< *= "her"*
Else
>Are_is< *= "Are"*
>He_she< *= "they"*
>His_her< *= "their"*
Endif
Endif]

>prior_injury1< "At any time PRIOR to January 1st, 2001, did >Title< EVER have any type of farming/ranching-related accidents or injuries?"

1 Yes
3 No *(go to* ***>i_ProgNote1b<****)*
8 Unknown *(go to* ***>i_ProgNote1b<****)*
9 Refused *(go to* ***>i_ProgNote1b<****)*

>prior_injnumber< "How many injuries or accidents did >Title< have?"

___ 1-20
98 Unknown
99 Refused

>prior_loss1< "Did this injury (any of these injuries) result in permanent disabilities? This includes the loss of a body part or other disfigurement, permanent pain or discomfort, or restricted activity."

Refused *(go to* ***>ab_next_member <****)*

>i_ProgNote1b< *[Programming Note: If (>hh_other< = 3 (not in household during 6 month period), Go to* ***>i_next_member<****; Else - Go to* ***>inj_log<****]*

>inj_log< "DURING THE SIXTH MONTH PERIOD, BETWEEN JANUARY 1 AND JUNE 30, 2001, Did >Title< have ANY type of accidents or injuries?"

1 Yes
3 No *(go to* ***>i_next_member<****)*
8 Unknown *(go to* ***>i_next_member<****)*
9 Refused *(go to* ***>i_next_member<****)*

>inj_farmop< "During that time, how many accidents or injuries did >Title< have, that were in any way related to YOUR farming or ranching operation? This includes activities such as transportation on roadways, or any other aspect of your operation, including raising animals for recreation or home use? It could also include someone who was injured while standing or playing in an area where these activities were taking place." [*Enumerator: Do not include bookwork, housework, or house repairs.*]

__ 0-5
8 Unknown
9 Refused

>inj_othrfarm< "How many accidents or injuries did >Title< have, related to SOMEONE ELSE'S farming or ranching operation?"

__ 0-5
8 Unknown
9 Refused

>inj_nonfarmop< "How many accidents or injuries did >Title< have, that were related to activities OTHER THAN farming or ranching?"

__ 0-5
8 Unknown
9 Refused

>i_ProgNote2< *[Programming Note: Set* ***>total_injuries<*** *= >inj_farmop< + >inj_othrfarm< + >inj_nonfarmop<]*

>verify_inj< "So >Title< had >total_injuries< injuries total, from January 1, 2001 to June 30, 2001.

>inj_farmop< - Related to your operation.

>inj_othrfarm< - Related to someone else's Operation /.

>inj_nonfarmop< - Related to Activities other than farming or ranching.

Is this correct?"

1 Yes
3 No *(go to* ***>inj_farmop<****)*

>i_next_event< *[Programming Note: The interview first loops through all injuriy* *events related to their own farming or ranching operation, **>type_inj<** = "On your own operation – injury #", **>iinj<** = 0 to >inj_farmop<; <u>Then</u> the interview loops through all injury events related to someone else's farming or ranching operation, **>type_inj<** = "On someone elses operation – injury #", **>iinj<** = 0 to >inj_othrfarm<; <u>Then</u> the interview loops through all injury events related to something other than farming or ranching, **>type_inj<** = "Activities other than farm/ranch – injury #", **>iinj<** = 0 to >inj_nonfarmop<*

>inj_where< "Referring to >type_inj<>iinj<, where did the accident or injury happen?"

1 Around the farm or ranch *(go to **>inj_source1<**)*
2 Roadway (farm/ranch operation road or public road) *(go to **>inj_source1<**)*
3 In or around the house *(go to **>inj_source1<**)*
4 Sports or recreation area *(go to **>inj_source1<**)*
5 Work (other than on the farm or ranch) *(go to **>inj_source1<**)*
6 School *(go to **>inj_source1<**)*
7 Public place (restaurant or other public place) *(go to **>inj_source1<**)*
8 Someone else's house *(go to **>inj_source1<**)*
9 Someone else's farm or ranch *(go to **>inj_source1<**)*
10 Other
11 Public outdoor area NEC (park, lake...) *(go to **>inj_source1<**)*
12 Cabin/operator owned vacation property *(go to **>inj_source1<**)*
98 Unknown *(go to **>inj_source1<**)*
99 Refused *(go to **>inj_source1<**)*

>inj_where_specify< "Specify the place."

____

>inj_source1< "Which of the following SOURCES were involved in the accident/injury? I need to read the entire list before you give me your answer. After I read the list, please tell me the one or two sources that were most directly involved in causing the accident:

1 Tractor
2 Motor Vehicle
3 Other Large machinery/ Equip
4 Sm. power equip/hand tools
5 Livestock or animals, including insects
6 Storage structures
7 Chemicals/drugs/ medications/Bio-aerosols
8 Body of water
9 Falls / Surfaces
10 Sports / Recreation
11 Housework
12 Yardwork/gardening
13 Work related (nonfarm)
14 Something else (physical object)
15 General Activity"
16 None - No secondary source
98 Unknown
99 Refused

>i_ProgNote3< *[Programming Note: Set **>Src_Cnt<** = 1<, go to **>i_ProgNote4<**]*

>inj_source2< "Referring to >type_inj<>iinj<:

Were any of the other sources that I read to you involved in the accident/injury?"

1 Tractor
2 Motor Vehicle
3 Other Large machinery/ Equip
4 Sm. power equip/hand tools
5 Livestock or animals, including insects
6 Storage structures
7 Chemicals/drugs/ medications/Bio-aerosols
8 Body of water
9 Falls / Surfaces
10 Sports / Recreation
11 Housework
12 Yardwork/gardening
13 Work related (nonfarm)
14 Something else (physical object)
15 General Activity"
16 None - No secondary source *(go to **>inj_activity<**)*
98 Unknown *(go to **>inj_activity<**)*
99 Refused *(go to **>inj_activity<**)*

>i_ProgNote4< *[Programming Note: If((>inj_source1< = 1 and >Src_Cnt< = 1) or (>inj_source2< = 1 and >Src_Cnt< = 2)), go to **>inj_tractor<**, else go to **>i_ProgNote5<**]*

>inj_tractor< "Was the tractor A LARGE TRACTOR WITH MORE THAN 20 HORSEPOWER, A SMALL TRACTOR WITH LESS THAN OR EQUAL TO 20 HORSEPOWER, OR A SKID/STEER TRACTOR (I.E. BOBCAT)?"

1 Tractor more than 20 HP *(call **Subroutine PTO**)*
2 Tractor less than or equal to 20 HP (i.e. garden tractor) *(call **Subroutine PTO**)*
3 A skid steer tractor (e.g., Bobcat) *(go to **>i_ProgNote5<**)*
8 Unknown *(go to **>i_ProgNote5<**)*
9 Refusal *(go to **>i_ProgNote5<**)*

Subroutine PTO

>inj_PTO< "Was a POWER-TAKE-OFF (PTO) involved in the accident?"

1 Yes *(go to **>inj_shield<**)*
3 No *(return)*
8 Unknown *(go to **>i_ProgNote5<**)*
9 Refused *(go to **>i_ProgNote5<**)*

>inj_shield< "Was the PTO SHIELDED?"

1 Yes
3 No
8 Unknown
9 Refused

RETURN

>i_ProgNote5< *[Programming Note: If((>inj_source1< = 2 and >Src_Cnt< = 1) or (>inj_source2< = 2 and >Src_Cnt< = 2)), go to **>inj_motorveh<**, else go to **>i_ProgNote6<**]*

>inj_motorveh< "What TYPE OF MOTOR VEHICLE was involved in the accident?"

1 Car *(go to **>i_ProgNote6<**)*
2 Van *(go to **>i_ProgNote6<**)*
3 Sport utility vehicle *(go to **>i_ProgNote6<**)*
4 Pickup truck *(go to **>i_ProgNote6<**)*
5 Grain truck *(go to **>i_ProgNote6<**)*
6 Other truck *(go to **>i_ProgNote6<**)*
7 Motorcycle or motor bike *(go to **>i_ProgNote6<**)*
8 All terrain vehicle: ATV *(go to **>i_ProgNote6<**)*
9 Snowmobile *(go to **>i_ProgNote6<**)*
10 Personal watercraft (i.e. Ski-doo) *(go to **>i_ProgNote6<**)*
11 Other
12 Bicycle *(go to **>i_ProgNote6<**)*
13 School bus *(go to **>i_ProgNote6<**)*
14 Golf cart *(go to **>i_ProgNote6<**)*
15 Go cart *(go to **>i_ProgNote6<**)*
16 Truck NOS *(go to **>i_ProgNote6<**)*
17 Railroad car *(go to **>i_ProgNote6<**)*
98 Unknown *(go to **>i_ProgNote6<**)*
99 Refused *(go to **>i_ProgNote6<**)*

>inj_motorveh_specify< "Please specify the type of motor vehicle."

____

>i_ProgNote6< *[Programming Note: If((>inj_source1< = 3 and >Src_Cnt< = 1) or (>inj_source2< = 3 and >Src_Cnt< = 2)), go to **>inj_largemach$_i$<**, else go to **>i_ProgNote7<**]*

>inj_largemach$_i$< "In the following list of large machinery or equipment, WHAT TYPE OR TYPES were involved in the accident? I need to read the entire list before you give me your answer." *[Enumerator Note: "involved" means the equipment/vehicle the person was operating/riding in or on, or the person was a bystander.]*

01 "Tillage equipment (Disc, moldboard plow, field cultivator, chisel plow, rotary hoe, row crop cultivator, powered tiller, cultipacker, etc.)" *(go to **>i_ProgNote6a<**)*
02 "Planting equipment (i.e. planters, drills, etc.)" *(go to **>i_ProgNote6a<**)*
03 "Harvesting equipment (Combines, pickers, forage harvesters, mowers balers, stackers, specialty harvesters, etc.)" *(go to **>i_ProgNote6a<**)*
04 "Augers / Elevators (Portable and fixed augers, elevators or conveyors)" *(go to **>i_ProgNote6a<**)*
05 "Feed grinder / mixer" *(go to **>i_ProgNote6a<**)*
06 "Irrigation equipment" *(go to **>i_ProgNote6a<**)*
07 "Wagons / Trailers (hay racks, forage wagons, gravity box, graincart, etc.)" *(go to*

>i_ProgNote6a<)

08 “Chemical and fertilizer application equipment” *(go to **>i_ProgNote6a<**)*

09 “Manure application equipment” *(go to **>i_ProgNote6a<**)*

10 “Other farm equipment; **powered by an external source** (silage / forage blowers, grain dryers, etc.)” *(go to **>i_ProgNote6a<**)*

11 “Other farm equipment; **self-powered** (Back-hoe, Caterpillar, forklift, earthmoving equipment, etc.)” *(go to **>i_ProgNote6a<**)*

12 “Milking equipment” *(go to **>i_ProgNote6a<**)*

13 “Riding lawn mower” *(go to **>i_ProgNote6a<**)*

14 “Other powered equipmen”

00 No more machinery involved in accident *(go to **>i_ProgNote6a<**)*

98 Unknown *(go to **>i_ProgNote6a<**)*

99 Refusal *(go to **>i_ProgNote6a<**)*

>inj_lgmach_specify< "Please specify the type of large machinery.” _________________

>i_ProgNote6a< *[Programming Note: If ((>inj_largemach$_1$< ge 1 and >inj_largemach$_1$< le 5) or (>inj_largemach$_1$< ge 8 and >inj_largemach$_1$< le 10) or (>inj_largemach$_2$< ge 1 and >inj_largemach$_2$< le 5) or (>inj_largemach$_2$< ge 8 and >inj_largemach$_2$< le 10) or (>inj_largemach$_3$< ge 1 and >inj_largemach$_3$< le 5) or (>inj_largemach$_3$< ge 8 and >inj_largemach$_3$< le 10) or (>inj_largemach$_4$< ge 1 and >inj_largemach$_4$< le 5) or (>inj_largemach$_4$< ge 8 and >inj_largemach$_4$< le 10) or (>inj_largemach$_5$< ge 1 and >inj_largemach$_5$< le 5) or (>inj_largemach$_5$< ge 8 and >inj_largemach$_5$< le 10)) call **Subroutine PTO**]*

>i_ProgNote7< *[Programming Note: If((>inj_source1< = 4 and >Src_Cnt< = 1) or (>inj_source2< = 4 and >Src_Cnt< = 2)), go to **>inj_smequip<**, else go to **>i_ProgNote8<**]*

>inj_smequip< “What TYPE OF SMALL EQUIPMENT OR HAND TOOLS were involved in the accident?”

1 Stationary powered shop tools(table saw, drill press, etc.) *(go to **>i_ProgNote8<**)*

2 Portable powered hand tool (portable saw or drill, electric screw driver, etc.) *(go to **>i_ProgNote8<**)*

3 Hand tool (hammer, chisel, saw, etc.) *(go to **>i_ProgNote8<**)*

4 Chain saw *(go to **>i_ProgNote8<**)*

5 Portable grinder *(go to **>i_ProgNote8<**)*

6 Stationary grinder *(go to **>i_ProgNote8<**)*

7 Lawn mower *(go to **>i_ProgNote8<**)*

8 Snow blower *(go to **>i_ProgNote8<**)*

9 Garden tiller *(go to **>i_ProgNote8<**)*

10 Syringe/vaccination needle *(go to **>i_ProgNote8<**)*

11 Post-hole digger/driver *(go to **>i_ProgNote8<**)*

12 Grinder NOS *(go to **>i_ProgNote8<**)*

13 Other

98 Unknown *(go to **>i_ProgNote8<**)*

99 Refusal *(go to **>i_ProgNote8<**)*

>inj_smequip_specify< "Please specify the type of small equipment.” ________________

>i_ProgNote8< *[Programming Note: If((>inj_source1< = 5 and >Src_Cnt< = 1)*

or (>inj_source2< = 5 and >Src_Cnt< = 2)), go to ***>inj_animals<****,*
else go to ***>i_ProgNote9<****]*

>inj_animals< "What TYPE OF LIVESTOCK OR OTHER ANIMALS were involved in the accident?"

1 Dairy cow with newborn calf *(go to **>i_ProgNote9<**)*
2 Dairy cow or heifer *(go to **>i_ProgNote9<**)*
3 Dairy bull *(go to **>i_ProgNote9<**)*
4 Dairy calf *(go to **>i_ProgNote9<**)*
5 Beef cow with newborn calf *(go to **>i_ProgNote9<**)*
6 Beef cow, steer or heifer *(go to **>i_ProgNote9<**)*
7 Beef bull *(go to **>i_ProgNote9<**)*
8 Beef calf *(go to **>i_ProgNote9<**)*
9 Sow with piglets *(go to **>i_ProgNote9<**)*
10 Sow without piglets / Gilt *(go to **>i_ProgNote9<**)*
11 Feeder pig *(go to **>i_ProgNote9<**)*
12 Boar *(go to **>i_ProgNote9<**)*
13 Poultry *(go to **>i_ProgNote9<**)*
14 Sheep *(go to **>i_ProgNote9<**)*
15 Horse *(go to **>i_ProgNote9<**)*
16 Stud horse / Stallion *(go to **>i_ProgNote9<**)*
17 Dairy, unspecified/unknown *(go to **>i_ProgNote9<**)*
18 Beef, unspecified/unknown *(go to **>i_ProgNote9<**)*
19 Swine/Hogs unspecified/unknown *(go to **>i_ProgNote9<**)*
20 Cow, unspecified/unknown *(go to **>i_ProgNote9<**)*
21 Calf, unspecified/unknown *(go to **>i_ProgNote9<**)*
22 Bull, unspecified/unknown *(go to **>i_ProgNote9<**)*
23 Cattle, unspecified/unknown *(go to **>i_ProgNote9<**)*
24 Dog *(go to **>i_ProgNote9<**)*
25 Cat *(go to **>i_ProgNote9<**)*
26 Insect (Tick, bee, spider...) *(go to **>i_ProgNote9<**)*
27 Deer *(go to **>i_ProgNote9<**)*
28 Other
98 Unknown *(go to **>i_ProgNote9<**)*
99 Refusal *(go to **>i_ProgNote9<**)*

>inj_animals_specify< "Please specify the type of livestock." ________________

>i_ProgNote9< *[Programming Note: If((>inj_source1< = 6 and >Src_Cnt< = 1) or (>inj_source2< = 6 and >Src_Cnt< = 2)), go to* ***>inj_storage<****, else go to* ***>i_ProgNote9<****]*

>inj_storage< "What KIND OF STORAGE STRUCTURE was it?"

1 Feed container / feed bunk *(go to **>i_ProgNote10<**)*
2 Livestock barn / Barn *(go to **>i_ProgNote10<**)*
3 Grain bin / granary *(go to **>i_ProgNote10<**)*
4 Corn crib *(go to **>i_ProgNote10<**)*
5 Silo *(go to **>i_ProgNote10<**)*

6 Machine shed *(go to* ***>i_ProgNote10<****)*
7 Garage *(go to* ***>i_ProgNote10<****)*
8 Workshop / tool shed / shed *(go to* ***>i_ProgNote10<****)*
9 Manure pit / tank *(go to* ***>i_ProgNote10<****)*
10 Fruit or other non-grain crop storage *(go to* ***>i_ProgNote10<****)*
11 Other
98 Unknown *(go to* ***>i_ProgNote10<****)*
99 Refusal *(go to* ***>i_ProgNote10<****)*

>inj_storage_specify< "Please specify the kind of storage structure." _______________

>i_ProgNote10< *[Programming Note: If((>inj_source1< = 7 and >Src_Cnt< = 1) or (>inj_source2< = 7 and >Src_Cnt< = 2)), go to* ***>inj_chemical<****, else go to* ***>i_ProgNote11<****]*

>inj_chemical< "What TYPE OF CHEMICALS, DRUGS OR MEDICATIONS were involved in the accident?"

1 Pesticides including: insecticides, herbicides, fungicides and fumigants *(go to* ***>inj_pesticide<****)*
2 Anhydrous ammonia *(go to* ***>inj_pesticide<****)*
3 Fuels, lubricants or cleaning agents *(go to* ***>inj_pesticide<****)*
4 Other chemical products, such as household products, paint, solvents, etc. *(go to* ***>i_ProgNote11<****)*
5 Veterinary medicines *(go to* ***>i_ProgNote11<****)*
6 Bio-aerosols & Plant toxins (Such as molds, funguses, etc.) *(go to* ***>i_ProgNote11<****)*
7 Other
8 Unknown *(go to* ***>i_ProgNote11<****)*
9 Refusal *(go to* ***>i_ProgNote11<****)*

>inj_chemical_specify< "Specify the type and name." _______________________ *(go to* ***>i_ProgNote11<****)*

>inj_pesticide< "Was the chemical or pesticide STORED IN A CONTAINER LABELED WITH THE SIGNAL WORD 'DANGER' OR 'WARNING'?"

1 Yes 8 YYes 8 Unknown
3 No 9 No 9 Refusal

>i_ProgNote11< *[Programming Note: If((>inj_source1< = 8 and >Src_Cnt< = 1) or (>inj_source2< = 8 and >Src_Cnt< = 2)), go to* ***>inj_water<****, else go to* ***>i_ProgNote12<****]*

>inj_water< "What TYPE OF BODY OF WATER was involved in the accident?"

1 Lake *(go to* ***>i_ProgNote12<****)*
2 River, stream, or creek *(go to* ***>i_ProgNote12<****)*
3 Swamp *(go to* ***>i_ProgNote12<****)*
4 Pond (including stock pond) *(go to* ***>i_ProgNote12<****)*
5 Stock tank *(go to* ***>i_ProgNote12<****)*
6 Water-filled ditch *(go to* ***>i_ProgNote12<****)*
7 Swimming pool *(go to* ***>i_ProgNote12<****)*

8 Bath tub *(go to* ***>i_ProgNote12<****)*
9 Hot tub or spa *(go to* ***>i_ProgNote12<****)*
10 Other
98 Unknown *(go to* ***>i_ProgNote12<****)*
99 Refusal *(go to* ***>i_ProgNote12<****)*

>inj_water_specify< "Please specify the type of body of water." ________________

>i_ProgNote12< *[Programming Note: If((>inj_source1< = 9 and >Src_Cnt< = 1) or (>inj_source2< = 9 and >Src_Cnt< = 2)), go to* ***>inj_fall<****, else go to* ***>i_ProgNote13<****]*

>inj_fall< "When >Title< fell, did >he_she< fall on LEVEL GROUND OR FROM A DIFFERENT LEVEL?" *[Enumerator: If fall from one level to another, probe to classify into #1-6. Use 7 only if fall can't be classified into #1-6.]*

1 Fall on or from stairs or steps
2 Fall on or from ladders or scaffolding more than 20 ft.
3 Fall on or from ladders or scaffolding less than or equal to 20 ft.
4 Fall from or out of building or other structure
5 Fall into hole or other opening in surface
6 Fall on same level from slipping, tripping, or stumbling
7 Fall from one level to another
8 Slips & trips not resulting in a fall
98 Unknown
99 Refusal

>i_ProgNote13< *[Programming Note: If((>inj_source1< = 10 and >Src_Cnt< = 1) or (>inj_source2< = 10 and >Src_Cnt< = 2)), go to* ***>inj_sports<****, else go to* ***>i_ProgNote13a<****]*

>inj_sports< "What SPORT OR RECREATIONAL ACTIVITY >was_were< >Title< involved in when >he_she< got hurt?"

11 Aerobics workout
12 Archery
13 Baseball
14 Basketball
15 Bicycling
16 Boating
17 Bowling
18 Broadjumping
19 Broomball
20 Cheerleading
21 Dancing
22 Field Hockey
23 Football
24 Golf
25 Gymnastics
26 Horseplay(adult)
27 Hunting
28 Ice fishing/Fishing
29 Ice hockey
30 Ice skating
31 Martial arts (judo, karate etc)
32 Physical education activities, general (non-specific)
33 Play activities, general childrens' (non-specific)
34 Playground activities
35 Racquetball
36 Rollerskating
37 Rollerblading
38 Running/jogging
39 Skateboarding
40 Skiing, crosscountry
41 Skiing/Snow-boarding, downhill
42 Sledding
43 Snowmobiling
44 Soccer
45 Softball
46 Swimming / Diving
47 Target practice/shooting (firearm, other than hunting
48 Tennis
49 Track and field
50 Volleyball
51 Water skiing
52 Weight lifting
53 3 - Wheeling / 4 - wheeling
54 Wrestling
55 Trampoline
56 Rodeo / Rodeo activities
57 Bystander
58 Horseback riding/racing
59 Kickball
60 Rugby
61 Riding/jumping Dirt bike / Motocross
10 Other, specify
98 Unknown
99 Refusal

>i_ProgNote13a< *[Programming Note: If(>inj_sports< not equal 10 and >inj_sports not equal 57), go to* ***>inj_sport_specify<****, else go to* ***>i_ProgNote13b<****]*

>inj_sport_specify< "Please specify the sport." ________________

>i_ProgNote13b< *[Programming Note: If((>inj_source1< = 14 and >Src_Cnt< = 1) or (>inj_source2< = 14 and >Src_Cnt< = 2)), go to* ***>inj_selse<****, else go to* ***>i_ProgNote14<****]*

>inj_selse< "What physical object was involved when >Title< got hurt?"

1 Gate / Door *(go to* ***>i_ProgNote14<****)*
2 Wire / Barbed wire *(go to* ***>i_ProgNote14<****)*
3 Glass / Window *(go to* ***>i_ProgNote14<****)*
4 Nail *(go to* ***>i_ProgNote14<****)*
5 Stone / Rock / Bricks *(go to* ***>i_ProgNote14<****)*
6 Fence / Fence post *(go to* ***>i_ProgNote14<****)*
7 Pipe / Bar / Large piece of metal *(go to* ***>i_ProgNote14<****)*

8 Ladder / Scaffolding *(go to* ***>i_ProgNote14<****)*
9 Foreign Object (Metal / wood / etc. – Splinter / chip / etc.) *(go to* ***>i_ProgNote14<****)*
10 Furniture / Cabinets / Large appliances *(go to* ***>i_ProgNote14<****)*
11 Rope / String / Twine / Reins / Bungee strap *(go to* ***>i_ProgNote14<****)*
12 Other.
98 Unknown *(go to* ***>i_ProgNote14<****)*
99 Refusal *(go to* ***>i_ProgNote14<****)*

>inj_selse_specify< "Please specify the physical object." ________________

>i_ProgNote14< *[Programming Note:*
If ((>inj_source1< = 11 and >Src_Cnt< = 1) or
(>inj_source2< = 11 and >Src_Cnt< = 2))
>activity< = "HOUSEWORK" *go to* ***>inj_general<***
Else if (>inj_source1< = 12 and >Src_Cnt< = 1) or
(>inj_source2< = 12 and >Src_Cnt< = 2)
>activity< = "YARDWORK"*go to* ***>inj_general<***
Else if (>inj_source1< = 13 and >Src_Cnt< = 1) or (>inj_source2< = 13 and >Src_Cnt< = 2)
>activity< = "WORK UNRELATED TO FARM WORK"
go to ***>inj_general<***
Else if (((>inj_source1< = 15 or >inj_source1< = 16 or >inj_source1< = 98 or >inj_source1< = 99) and >Src_Cnt< = 1) or (>inj_source2< = 15 and >Src_Cnt< = 2)
>activity< = "ACTIVITY" *go to* ***>inj_general<***
Else if (>Src_Cnt< = 1) ***>Src_Cnt< = 2***
go to ***>inj_source2<*** *Else*
go to ***>inj_activity<*** *End if]*

>inj_general< "What type of >activity< >was_were< >Title< involved in when >he_she< got hurt?" *[Enumerator:* ***Type response exactly as stated + end with ///****. After entering information, press ESC to continue with interview.]*

____

>inj_activity< "Tell me in your own words, what >was_were< >Title< DOING at the time of the injury?" *[Enumerator:* ***Type response exactly as stated + end with ///****. After entering information, press ESC to continue with interview.]*

____

>injury_how< "In your own words, HOW did the accident happen?" *[Enumerator:* ***Type response exactly as stated + end with ///****. After entering information, press ESC to continue with interview.]* ____

>inj_date< "What was the DATE of the accident?" *[Enumerator: Ente as mm-dd-yyyy.]*

__/__/___	(mm/dd/yyyy) *(go to* ***>inj_time<****)*
99999998	Unknown
99999999	Resusal *(go to* ***>i_end1<****)*

>inj_month< "THEN, can you tell me the MONTH in which the accident happened?"

1	January *(go to **>inj_time<**)*	8	August *(go to **>inj_time<**)*
2	February *(go to **>inj_time<**)*	9	September *(go to **>inj_time<**)*
3	March *(go to **>inj_time<**)*	10	October *(go to **>inj_time<**)*
4	April *(go to **>inj_time<**)*	11	November *(go to **>inj_time<**)*
5	May *(go to **>inj_time<**)*	12	December *(go to **>inj_time<**)*
6	June *(go to **>inj_time<**)*	98	Unknown
7	July *(go to **>inj_time<**)*	99	Refusal *(go to **>i_end1<**)*

>inj_season< "Could you tell me if this accident happened in the SPRING, SUMMER, FALL OR WINTER?"

1	Spring (Mar / Apr /4May)	Winter (Dec / Jan / Feb)
2	Summer (Jun / Jul /8Aug)	Unknown
3	Fall (Sept / Oct / N9v)	Refusal *(go to **>i_end1<**)*

>inj_time< "What TIME OF DAY did it happen?"

____:____	(hh:mm) military time *(go to **>inj_part1<**)*
99999998	Unknown
99999999	Resusal

>inj_time2< "THEN, could you tell me if this accident happened in the MORNING, AFTERNOON, EVENING OR NIGHT?"

1	Morning (6:00 am - 11:59 am)	4	Night (12:00 am - 5:59 am)
2	Afternoon (12:00 pm - 5:59 pm)	8	Unknown
3	Evening (6:00 pm - 11:59 pm)	9	Refusal

>inj_part1$_i$< "What PARTS OF THE BODY were injured? If you have the DARK BLUE card with the figure, it will help you to answer this question."

101 Head / Skull
102 Brain
103 Face (Forehead, Cheek, Nose, Lip, Chin, Ear)
104 Eye / Eyelid
105 Dental / Tooth
106 Neck (Cervical area)
107 Spinal cord / Spine (Vertebrae, Sacrum, Tailbone / Coccyx, Discs)
108 Back (muscles/skin)
109 Internal chest (Ribs, Heart, Lung, Bronchial, Esophagus, Diaphragm)
110 External chest (Skin)
111 Internal abdomen (Stomach, Liver, Kidney, Gall bladder, Intestines, Appendix, Spleen, Pancreas)
112 External abdomen (Skin)
113 Shoulder / Collar bone / Shoulder blade
114 Arm / Elbow / Wrist / Carpal tunnel
115 Hand
116 Finger (s) / Thumb (s)
117 Internal hips / Pelvis (Uterus, Ovaries, Bladder, Rectum)
118 External hips / Pelvis (Skin)

119 Buttocks
120 Genitals / “Private parts”
121 Leg (Thigh (s), Shin, Calf)
122 Knee
123 Ankle
124 Foot / Heel
125 Toes
126 General systems
127 No additional body parts
128 Other
129 Entire body
998 Unknown
999 Refusal

>i_ProgNote15< *[Programming Note: Loop through body parts listed from $_i$ = 1 to 6, at end go to* ***>inj_loc<****; otherwise*
If (>inj_part1$_i$< = 127 or >inj_part1$_i$< = 998 or >inj_part1$_i$< = 999) go to ***>inj_loc<***
Else If (>inj_part1$_i$< = 128) go to ***>inj_part1_specify<***
Else go to ***>desc_inj$_i$<***
End If]

>inj_part1$_i$_specify< “Specify the body part.”

____

>desc_inj$_i$< "Describe what types of injuries occured to the >inj_part1$_i$< Examples include: bruise or contusion, broken bone or fracture, amputation, or loss of consciousness.” *[Enumerator:* ***Type response exactly as stated + end with ///****. After entering information, press ESC to continue with interview.]*

____ *(go to* ***>i_ProgNote15<****)*

>inj_serious< “How would you RATE THE SERIOUSNESS of this overall injury. Was it Minor, Moderate, Serious, Severe or Life-threatening?” *[Enumerator: If death occurred, enter 6.]*

		Minor 4	Severe
		5	Life threatening
1	Minor	6	Death *(go to* ***>inj_care1<****)*
2	Moderate	8	Unknown
3	Serious	9	Refusal

>inj_loc< “As a result of this accident, was there a LOSS OF CONSCIOUSNESS?”

1	Yes	8	8 Unknown *(go to* ***>inj_amnesia<****)*
3	No *(go to* ***>inj_amnesia<****)*		9 Refusal *(go to* ***>inj_amnesia<****)*

>inj_loc2< “Was this due to a BLOW TO THE HEAD, BEING OVERCOME BY FUMES OR SOMETHING ELSE?”

1 A blow to the head *(go to* ***>inj_loc3<****)*
2 Being overcome by fumes *(go to* ***>inj_loc3<****)*
3 Other

8 Unknown *(go to **>inj_loc3<**)*
9 Refusal *(go to **>inj_loc3<**)*

>inj_loc2_specify< "Specify the reason for unconsciousness." *[Enumerator: **Type response exactly as stated + end with ///.** After entering information, press ESC to continue with interview.]* ____

>inj_loc3< "HOW LONG did it last?"

1 Less than 5 minutes
2 5 to less than 10 minutes
3 10 to less than 30 minutes
4 30 minutes to less than 1 hour
5 1 hour to less than 6 hours
6 6 hours to less than 24 hours
7 24 hours or more
8 Unknown
9 Refusal

>inj_amnesia< "Was there a LOSS OF AWARENESS, AMNESIA, OR CONFUSION?"

1 Yes
3 No *(go to **>inj_restrict<**)*
8 Unknown *(go to **>inj_restrict<**)*
9 Refusal *(go to **>inj_restrict<**)*

>inj_amnesia2< "Was this due to a BLOW TO THE HEAD, BEING OVERCOME BY FUMES OR SOMETHING ELSE?"

1 A blow to the head *(go to **>inj_amnesia3<**)*
2 Being overcome by fumes *(go to **>inj_amnesia3<**)*
3 Other
8 Unknown *(go to **>inj_amnesia3<**)*
9 Refusal *(go to**>inj_amnesia3<**)*

>inj_amnesia2_specify< "Specify the reason for amnesia." *[Enumerator: **Type response exactly as stated + end with ///.** After entering information, press ESC to continue with interview.]*

____

>inj_amnesia3< "HOW LONG did it last?"

1 Less than 5 minutes
2 5 to less than 10 minutes
3 10 to less than 30 minutes
4 30 minutes to less than 1 hour
5 1 hour to less than 6 hours
6 6 hours to less than 24 hours
7 24 hours or more
8 Unknown
9 Refusal

>inj_restrict< "As a result of this accident, HOW LONG were normal activities restricted? Normal activities are the things a person would ordinarily do on any given day."

0 No restriction *(go to **>inj_care1<**)*
1 0 to less than 4 hours
2 4 hrs to less than 1 day
3 1 day to less than 7 days
4 7 days to less than 14 days
5 14 days to less than 1 month

6 1 month to less than 3 months 8
7 3 months or more 9
8 Unknown *(go to **>inj_care1<**)*
9 Refusal *(go to **>inj_care1<**)*

>lost_farmwork< "Did >Title< lose ANY TIME from work around YOUR farming or ranching operation as a result of the accident?"

1 Yes
3 No *(go to **>lostotherwork<**)*
8 Unknown *(go to **>lostotherwork<**)*
9 Refusal *(go to **>lostotherwork<**)*

>lostfarmtime< "How MUCH TIME did >Title< lose from work?"

1 0 to less than 4 hours
2 4 hrs to less than 1 day
3 1 day to less than 7 days
4 7 days to less than 14 days
5 14 days to less than 1 month
6 1 month to less than 3 months
7 3 months or more
8 Unknown
9 Refusal

>lostotherwork< "Did >Title< lose ANY TIME from work at job(s) NOT RELATED to YOUR farming or ranching operation as a result of the accident?"

1 Yes
3 No *(go to **>restrict_now<**)*
8 Unknown *(go to **>restrict_now<**)*
9 Refusal *(go to **>restrict_now<**)*

>lostothertime< "How MUCH TIME did >Title< lose from these job(s)?"

1 0 to less than 4 hours
2 4 hrs to less than 1 day
3 1 day to less than 7 days
4 7 days to less than 14 days
5 14 days to less than 1 month
6 1 month to less than 3 months
7 3 months or more
8 Unknown
9 Refusal

>restrict_now< ">is_are< >Title< STILL RESTRICTED from carrying out >his_her< normal activities as a result of this injury?"

1 Yes
3 No *(go to **>inj_symptoms<**)*
8 Unknown *(go to **>inj_symptoms<**)*
9 Refusal *(go to **>inj_symptoms<**)*

>restrict_now2< "To what degree would you say >his_her< normal activities are CURRENTLY restricted? A small amount, a moderate amount or a large amount?"

1 A small amount
2 A moderate amount
3 A large amount
8 Unknown
9 Refusal

>inj_symptoms< "If you can turn to the two beige cards in the packet, it will help you identify some of these problems and symptoms.

At the present time, are there any PERSISTANT problems or symptoms related to this injury, including things such as numbness, pain, weakness, or some type of impairment?"

1 Yes
3 No *(go to* ***>inj_care1<****)*
8 Unknown *(go to* ***>inj_care1<****)*
9 Refusal *(go to* ***>inj_care1<****)*

>inj_symptoms2$_i$< "What part(s) of the body is/are affected? If you can turn to the dark blue card with the figure, it will help you answer this question."

101 Head / Skull
102 Brain
103 Face (Forehead, Cheek, Nose, Lip, Chin, Ear)
104 Eye / Eyelid
105 Dental / Tooth
106 Neck (Cervical area)
107 Spinal cord / Spine (Vertebrae, Sacrum, Tailbone / Coccyx, Discs)
108 Back (muscles/skin)
109 Internal chest (Ribs, Heart, Lung, Bronchial, Esophagus, Diaphragm)
110 External chest (Skin)
111 Internal abdomen (Stomach, Liver, Kidney, Gall bladder, Intestines, Appendix, Spleen, Pancreas)
112 External abdomen (Skin)
113 Shoulder / Collar bone / Shoulder blade
114 Arm / Elbow / Wrist / Carpal tunnel
115 Hand
116 Finger (s) / Thumb (s)
117 Internal hips / Pelvis (Uterus, Ovaries, Bladder, Rectum)
118 External hips / Pelvis (Skin)
119 Buttocks
120 Genitals / "Private parts"
121 Leg (Thigh (s), Shin, Calf)
122 Knee
123 Ankle
124 Foot / Heel
125 Toes
126 General systems
127 No additional body parts
128 Other
129 Entire body
998 Unknown
999 Refusal

>i_ProgNote16< *[Programming Note: Loop through body parts listed from $_i$ = 1 to 6, at end go to* ***>inj_care1<****; otherwise*

If (>inj_symptoms2$_i$< = 127 or >inj_symptoms2$_i$< = 998 or >inj_symptoms2$_i$< = 999) go to ***>inj_care1<***
Else If (>inj_symptoms2$_i$< = 128) go to ***>inj_sympoms2_specify<***
Else go to ***>desc_sym$_i$<***
End If]

>inj_symptoms2_specify< "Specify the body part."

____

>desc_sym$_i$< "What are the exact types of persistent problems or symptoms occurring to the >inj_symptoms2$_i$<.

Please refer to the two beige cards."

0 Persistent physical or mental impairment
1 Persistent numbness or tingling of injures area
2 Persistent pain only upon exertion or movement / intermittent pain
3 Persistent pain in injured area at all times
4 Headache that persists for more than a single day
5 General weakness
6 Weakness of arms or legs
7 Decreased range of motion
8 Paralysis
9 Loss of body part / amputation
10 Impaired vision, including blurred or double vision
11 Impaired speech
12 Impaired hearing
13 Reduced sense of balance or dizziness
14 Reduced ability to concentrate
15 Epilepsy / Convulsions
16 Reduced ability to do heavy work
17 Other, specify *[Enumerator:* ***Type response exactly as stated + end with ///.*** *After entering information, press ESC to continue with interview.]*
98 Unknown at this time if there will be permanent impairment
99 refusal

>inj_care1< "The following questions are about care of the injury. Was the injury treated by a health care professional, such as a doctor, nurse, chiropractor, dentist or other healthcare professional?"

1 Yes
3 No *(go to* ***>i_ProgNote18<****)*
8 Unknown *(go to* ***>i_ProgNote18<****)*
9 Refusal *(go to* ***>i_ProgNote18<****)*

>inj_care2$_i$< "In which of the following places did >Title< receive care?"

1	A doctor's office	6	At the scene of the accident
2	A hospital emergency room	7	Any other health care facility
3	A hospital as an in-patient (admitted to a hospital)	8	Unknown
4	A dentist's office	9	Refusal
5	A chiropractor's office		

>i_ProgNote17< [Programming Note:
If (>inj_care2$_{1}$< not equal 3 and >inj_care2$_{2}$< not equal 3 and >inj_care2$_{3}$< not equal 3 and >inj_care2$_{4}$< not equal 3 and >inj_care2$_{5}$< not equal 3 and >inj_care2$_{6}$< nt equal 3 and >inj_care2$_{7}$< not equal 3) *go to **>inj_insurance<** End If]*

>inj_hospital< "How long >was_were< >Title< in the hospital?"

____ days
998 Unknown
999 Refusal

>inj_insurance< "What percentage of the costs of care for this injury was covered by health or medical insurance? Was it none, less than 50%, 50% to less than 100% or 100%(no deductable)?"

0	None	3	100% (No deductible)
1	Less than 50%	8	Unknown
2	50% to less than 100%	9	Refusal

>i_ProgNote18< *[Programming Note:
If (>type_inj< = "On your own operation – injury #")*

>inj_ownfarm< "For clarification, WAS THIS injury in any way related to YOUR farming or ranching operation activities? This includes activities such as transportation on roadways, or any other aspect of your operation, such as raising animals for recreation or home use. It could also include someone who was injured while standing or playing in AREAS WHERE FARMING OR RANCHING ACTIVITIES WERE TAKING PLACE."

1 Yes *(go to **>i_Prognote19<**)*
3 No
8 Unknown
9 Refusal

>inj_lsfarm< "Was it in any way related to motor vehicles, machinery, equipment, tools, livestock or working animals, storage structures, chemicals or bodies of water that are part of your farming or ranching operation?"

1 Yes *(go to **>i_Prognote19<**)*
3 No
8 Unknown
9 Refusal

>inj_sefarm< "Was it in any way related to someone else's farming or ranching activities on YOUR operation?"

1 Yes *(go to **>i_Prognote19<**)*
3 No
8 Unknown
9 Refusal

>inj_whyfarm< "In what way was it related to YOUR farming or ranching operation?" *[Enumerator: **Type response exactly as stated + end with ///.** After entering information, press ESC to continue with interview.]* ____________________________________

>int_assess< "Was it in any way related to motor vehicles, machinery, equipment, tools, livestock or working animals, storage structures, chemicals or bodies of water that are part of your farming or ranching operation?"

1 Yes *(go to **>i_Prognote19<**)*
3 No
8 Unknown
9 Refusal

>i_ProgNote18< *[Programming Note: If (>age< ge 0 and >age< < 20 and (>inj_ownfarm< = 1 or >inj_lsfarm< = 1 or >inj_sefarm< = 1 or >int_assess< = 1)) >injmo< = 99 If ((>inj_date< ge {01/01/2001} and >inj_date< le {01/31/2001}) or >inj_month< = 1 or >inj_season< = 4) **>injmo<** = 1 Else if ((>inj_date< ge {02/01/2001} and >inj_date< le {02/28/2001}) or >inj_month< = 2) **injmo<** = 2 Else if ((>inj_date< ge {03/01/2001} and >inj_date< le {03/31/2001}) or >inj_month< = 3) **>injmo<** = 3 Else if ((>inj_date< ge {04/01/2001} and >inj_date< le {04/30/2001}) or >inj_month< = 4 or >inj_season< = 1**>injmo<** = 4 Else if ((>inj_date< ge {05/01/2001} and >inj_date< le {05/31/2001}) or >inj_month< = 5) **>injmo<** = 5 Else if ((>inj_date< ge {06/01/2001} and >inj_date< le {06/30/2001}) or >inj_month< = 6 or >inj_season< = 2) **>injmo<** = 6 Endif If (>injmo< = 99)Loop I = 1,6 If (>kidmo(>kidno<,i)< not equal 1) >kidmo(>kidno<,i) = 9 Continue Else >kidmo(>kidno<,i) = 1 End if End if] End If] Go to **>i_next_event<**] Loop j = 1, 6 If (>kidmo(>kidno<,j)< = 1) >no_f_inj(>kidno<)< = >no_f_inj(>kidno< + 1 Continue*
If (>no_f_inj(>kidno<)< > 0) >finj_kids< = >finj_kids< + 1
Go to >i_next_member<

Exposure Section

Control Selection Process

>e_ProgNote1< *[Programming Note: Carry over >persons19<, >kidmo(>persons19<,6)<, >no_f_inj(>persons19<)<, and >finj_kids<; Generate 3 random numbers, >random1<, >random2< and >random3<.*

Set: **>controlHH<** = 0; **>caseHH<** = 0

household control selection

If(>random1< is less than or equal to 0.188)
Household is selected as a control household

```
    >controlHH< = 1
Else
    go to >e_next_caco<
End If
```

subject control selection

```
    If (>random2< greater than 0 and >random2< less than or equal
    to 1/>persons19<)
        >exp< = 1
    Else If(>random2< greater than 1/>persons19< and >random2<
    less than or equal to 2/>persons19<)
        >exp< = 2
    ……
    Else If(>random2< greater than >persons19<-1/>persons19< and
    >random2< less than or equal to >persons19</>persons19<)
        >exp< = >persons19<
    End If
    Set control subject to household member with >kidno< = >exp<
```

index month control selection

```
        n = 125
        If (>kidmo(>exp<,1)< not equal 0) n = n - 5
        If (>kidmo(>exp<,2)< not equal 0) n = n - 6
        If (>kidmo(>exp<,3)< not equal 0) n = n - 12
        If (>kidmo(>exp<,4)< not equal 0) n = n - 17
        If (>kidmo(>exp<,5)< not equal 0) n = n - 40
        If (>kidmo(>exp<,6)< not equal 0) n = n - 45
        >a< = 0
        >b< = 0
        If (>kidmo(>exp<,1)< = 0)
            >b< = >b< + 2/n
            If (>random3< greater then >a< and >random3< less than
            or equal to >b<)
                >control_month< = 1
                go to >e_next_caco<
            Else
                >a< = >b<
            End If
        End If
        If (>kidmo(>exp<,2)< = 0)
            >b< = >b< + 1/n
            If (>random3< greater then >a< and >random3< less than
            or equal to >b<)
                >control_month< = 2
                go to >e_next_caco<
            Else
                >a< = >b<
            End If
        End If
```

```
If (>kidmo(>exp<,3)< = 0)
    >b< = >b< + 4/n
    If (>random3< greater then >a< and >random3< less than
    or equal to >b<)
        >control_month< = 3
        go to >e_next_caco<
    Else
        >a< = >b<
    End If
End If
If (>kidmo(>exp<,4)< = 0)
    >b< = >b< + 6/n
    If (>random3< greater then >a< and >random3< less than
    or equal to >b<)
        >control_month< = 4
        go to >e_next_caco<
    Else
        >a< = >b<
    End If
End If
If (>kidmo(>exp<,5)< = 0)
    >b< = >b< + 12/n
    If (>random3< greater then >a< and >random3< less than
    or equal to >b<)
        >control_month< = 5
        go to >e_next_caco<
    Else
        >a< = >b<
    End If
End If
If (>kidmo(>exp<,6)< = 0)
    >b< = >b< + 15/n
    If (>random3< greater then >a< and >random3< less than
    or equal to >b<)
        >control_month< = 6
        go to >e_next_caco<
    Else
        >a< = >b<
    End If
End If
```

Exposure Section Interview – Part I

>e_next_caco< *[Programming Note: The program loops through >imo< = 1-6, for >kidmo(>kidno<,>imo<)< = 1, for >kidno< = 1 to >persons19<, for >no_f_inj(>kidno<)< > 0 (set* **>caseHH<** = 1)*; Then interviewing for control subject >kidno< = >exp<, >imo< = >control_month<; Then, go to* ***>exp_the_end<****. Identifiers carried forward for each member from the Household Log are >Title<, >first_name's<, >age<, >he_she<, >his_her<, >him_her<, >Who_Pi<, >was_were<, >is_are<.]*

>e_ProgNote2< *[Programming Note:*
If (>imo< = 1)
>month< = "January, 2001"
>month_before< = "December, 2000"
Else If (>imo< = 2)
>month< = "February, 2001"
>month_before< = "January, 2001"
Else If (>imo< = 3)
>month< = "March, 2001"
>month_before< = "February, 2001"
Else If (>imo< = 4)
>month< = "April, 2001"
>month_before< = "March, 2001"
Else If (>imo< = 5)
>month< = "May, 2001"
>month_before< = "April, 2001"
Else If (>imo< = 6)
>month< = "June, 2001"
>month_before< = "May, 2001"
End If

>introduction12< "In the next section of the interview, I will be asking questions about activities that >Title< was involved in for a ONE MONTH period of time, >month_before<, as well as questions about >his_her< health status, medication use and general habits.

The first questions will be about activities OTHER THAN FARMING OR RANCHING that >he_she< has been involved in, such as jobs, school and sporting activities."

1 *Continue*

>e_ProgNote3< *[Programming Note: If (>age< < 5) go to* ***>sports1<****]*

>nonfarmwk< "During >month_before<, did >Title< work in any type of paid job NOT related to farming or ranching?"

1 Yes 8
3 No *(go to* ***>grade<****)*
8 Unknown *(go to* ***>grade<****)*
9 Refusal *(go to* ***>grade<****)*

>nonfarmwk_wks< “During that month, HOW MANY WEEKS did >he_she< work?”

__ 1-4 weeks
8 Unknown *(go to **>grade<**)*
9 Refusal *(go to **>grade<**)*

>nonfarmwk_hrs< “On average, how many HOURS PER WEEK?”

____ 1-130 hours
998 Unknown
999 Refusal

>grade< “During >month_before<, what was >first_name’s< grade in school? (If >Title< didn’t go to school that month, what grade had >he_she< last attended?)”

0 Kindergarten
____ 1–16 Years
17 Pre-school
97 N/A – None *(go to **>sports1<**)*
98 Unknown
99 Refusal

>school_wks< “During >month_before<, HOW MANY WEEKS did >he_she< spend in classes at school?”

0 None – Did not go to school *(go to **>sports1<**)*
__ 1-4 weeks
8 Unknown
9 Refusal

>school_hrs< “On average, how many HOURS PER WEEK?”

___ 1-40 hours
98 Unknown
99 Refusal

>school_rate< “How would you rate >his_her< school performance? Was it excellent, above average, average, below average or not satisfactory?”

1 Excellent *(go to **>sports1<**)*
2 Above average *(go to **>sports1<**)*
3 Average *(go to **>sports1<**)*
4 Below average *(go to **>sports1<**)*
5 Not satisfactory *(go to **>sports1<**)*
6 Other
8 Unknown *(go to **>sports1<**)*
9 Refusal *(go to **>sports1<**)*

>school_specify< “Please specify other.”________________________

>sports1< “During >month_before<, did >Title< participate in any sports or recreational activities?”

1 Yes 8
3 No *(go to **>introduction14<**)*
8 Unknown *(go to **>introduction14<**)*
9 Refusal *(go to **>introduction14<**)*

>sports2$_i$< "In which sports or recreational activities did >he_she< particitpate?"

11 Aerobics workout
12 Archery
13 Baseball
14 Basketball
15 Bicycling
16 Boating
17 Bowling
18 Broadjumping
19 Broomball
20 Cheerleading
21 Dancing
22 Field Hockey
23 Football
24 Golf
25 Gymnastics
26 Horseplay(adult)
27 Hunting
28 Ice fishing/Fishing
29 Ice hockey
30 Ice skating
31 Martial arts (judo, karate etc)
32 Physical education activities, general (non-specific)
33 Play activities, general childrens' (non-specific)
34 Playground activities
35 Racquetball
36 Rollerskating
37 Rollerblading
38 Running/jogging
39 Skateboarding
40 Skiing, crosscountry
41 Skiing/Snow-boarding, downhill
42 Sledding
43 Snowmobiling
44 Soccer
45 Softball
46 Swimming / Diving
47 Target practice/shooting (firearm, other than hunting
48 Tennis
49 Track and field
50 Volleyball
51 Water skiing
52 Weight lifting
53 3 - Wheeling / 4 - wheeling
54 Wrestling
55 Rodeo
56 4H or FFA
57 Horse riding/shows
58 Music-Band, choir, etc.
59 Scouting
60 Motocross/Motorcycle/Dirt bike riding/racing
10 Other
98 Unknown
99 Refusal

>e_ProgNote4< *[Programming Note: If (>sports2$_1$< not equal 10 and >sports2$_2$< not equal 10 and >sports2$_3$< not equal 10 and >sports2$_4$< not equal 10 and >sports2$_5$< not equal 10 and >sports2$_6$< not equal 10 and >sports2$_7$< not equal 10) go to **>sports_wks<**]*

>sports_specify< "Please specify other."

____

>sports_wks< "During that month, HOW MANY WEEKS did >he_she< participate in these sports or recreational activities?"

__ 1-4 weeks
8 Unknown *(go to **>introduction14<**)*
9 Refusal *(go to **>introduction14<**)*

>sports_hrs< "On average, how many HOURS PER WEEK?"

___ 1-60 hours

98 Unknown
99 Refusal

>introduction14< “In the following questions, I will be asking about >first_name’s< prior health status, medication use and general health habits.”

1 *Continue*

>prior_health< “Prior to >month<, did >he_she< have any of the following health or medical problems, that were diagnosed at ANY TIME by a physician, osteopath, chiropractor, or other health care provider?”

1 *Continue*

>pain< “Chronic or periodic pain in any part of their body?”

1 Yes 8 Unknown
3 No 9 Refusal

>movement< “Restriction of movement of any body part?”

1 Yes 8 Unknown
3 No 9 Refusal

>arthritis< “Arthritis?”

1 Yes 8 Unknown
3 No 9 Refusal

>liver< “Liver disease?”

1 Yes 8 Unknown
3 No 9 Refusal

>kidney< “Kidney disease?”

1 Yes 8 Unknown
3 No 9 Refusal

>heart< “Heart disease?”

1 Yes 8 Unknown
3 No 9 Refusal

>blood_pressure< “High blood pressure?”

1 Yes 8 Unknown
3 No 9 Refusal

>diabetes< “Diabetes?”

1 Yes 8 Unknown
3 No 9 Refusal

>ADHD< "Hyperactivity or Attention Deficit Hyperactivity Disorder (ADHD)?"

1 Yes 8 Unknown
3 No 9 Refusal

>vision< "Vision problems not correctable with lenses?"

1 Yes 8 Unknown
3 No 9 Refusal

>stress< "Stress?"

1 Yes 8 Unknown
3 No 9 Refusal

>depress< "Depression or other psychological problems?"

1 Yes 8 Unknown
3 No 9 Refusal

>brain< "Brain or spinal cord injury or disease?"

1 Yes 8 Unknown
3 No 9 Refusal

>epilepsy< "Epilepsy?"

1 Yes
3 No
8 Unknown
9 Refusal

>asthma< "Asthma?"
1 Yes
3 No
8 Unknown
9 Refusal

>allergies< "Allergies?"

1 Yes 8 Unknown
3 No 9 Refusal

>e_ProgNote5< *[Programming Note: If (>pain< not equal 1, go to **>e_ProgNote6<**]*

>pain_int< "During >month_before<, did CHRONIC OR PERIODIC PAIN interfere with any of >his_her< regular activities?"

1 Yes 8 Unknown
3 No 9 Refusal

>e_ProgNote6< *[Programming Note: If (>movement< not equal 1, go to **>e_ProgNote7<**]*

>movement_int< "During >month_before<, did RESTRICTION OF MOVEMENT interfere with any of >his_her< regular activities?"

1 Yes 8 Unknown
3 No 9 Refusal

>e_ProgNote7< *[Programming Note: If (>arthritis< not equal 1, go to* ***>e_ProgNote8<****]*

>arthritis_int< "During >month_before<, did ARTHRITIS interfere with any of >his_her< regular activities?"

1 Yes 8 Unknown
3 No 9 Refusal

>e_ProgNote8< *[Programming Note: If (>liver< not equal 1, go to* ***>e_ProgNote9<****]*

>liver_int< "During >month_before<, did LIVER DISEASE interfere with any of >his_her< regular activities?"

1 Yes 8 Unknown
3 No 9 Refusal

>e_ProgNote9< *[Programming Note: If (>kidney< not equal 1, go to* ***>e_ProgNote10<****]*

>kidney_int< "During >month_before<, did KIDNEY DISEASE interfere with any of >his_her< regular activities?"

1 Yes 8 Unknown
3 No 9 Refusal

>e_ProgNote10< *[Programming Note: If (>heart< not equal 1, go to* ***>e_ProgNote11<****]*

>heart_int< "During >month_before<, did HEART DISEASE interfere with any of >his_her< regular activities?"

1 Yes 8 Unknown
3 No 9 Refusal

>e_ProgNote11< *[Programming Note: If (>blood_pressure< not equal 1, go to* ***>e_ProgNote12<****]*

>blood_pressure_int< "During >month_before<, did HIGH BLOOD PRESSURE interfere with any of >his_her< regular activities?"

1 Yes 8 Unknown
3 No 9 Refusal

>e_ProgNote12< *[Programming Note: If (>diabetes< not equal 1, go to* ***>e_ProgNote13<****]*

>diabetes_int< "During >month_before<, did DIABETES interfere with any of >his_her< regular activities?"

1 Yes 8 Unknown
3 No 9 Refusal

>e_ProgNote13< *[Programming Note: If (>ADHD< not equal 1, go to* ***>e_ProgNote14<****]*

>ADHD_int< "During >month_before<, did HYPERACTIVITY OR ADHD interfere with any of >his_her< regular activities?"

1 Yes — 8 Unknown
3 No — 9 Refusal

>e_ProgNote14< *[Programming Note: If (>vision< not equal 1, go to* ***>e_ProgNote15<****]*

>vision_int< "During >month_before<, did VISION PROBLEMS NOT CORRECTABLE WITH LENSES interfere with any of >his_her< regular activities?"

1 Yes — 8 Unknown
3 No — 9 Refusal

>e_ProgNote15< *[Programming Note: If (>stress< not equal 1, go to* ***>e_ProgNote16<****]*

>stress_int< "During >month_before<, did STRESS interfere with any of >his_her< regular activities?"

1 Yes — 8 Unknown
3 No — 9 Refusal

>e_ProgNote16< *[Programming Note: If (>depress< not equal 1, go to* ***>e_ProgNote17<****]***>depress_int<** "During >month_before<, did DEPRESSION OR OTHER PSYCHOLOGICAL PROBLEMS interfere with any of >his_her< regular activities?"

1 Yes — 8 Unknown
3 No — 9 Refusal

>e_ProgNote17< *[Programming Note: If (>brain< not equal 1, go to* ***>e_ProgNote18<****]*

>brain_int< "During >month_before<, did BRAIN OR SPINAL CORD INJURY OR DISEASE interfere with any of >his_her< regular activities?"

1 Yes — 8 Unknown
3 No — 9 Refusal

>e_ProgNote18< *[Programming Note: If (>epilepsy< not equal 1, go to* ***>e_ProgNote19<****]*

>epilepsy_int< "During >month_before<, did EPILIPSY interfere with any of >his_her< regular activities?"

1 Yes — 8 Unknown
3 No — 9 Refusal

>e_ProgNote19< *[Programming Note: If (>asthma< not equal 1, go to* ***>e_ProgNote20<****]*

>asthma_int< "During >month_before<, did ASTHMA interfere with any of >his_her< regular activities?"

1 Yes　　8 Unknown
3 No　　9 Refusal

>e_ProgNote20< *[Programming Note: If (>allergies< not equal 1, go to* ***>gen_health<****]*

>allergies_int< "During >month_before<, did ALLERGIES interfere with any of >his_her< regular activities?"

1 Yes　　8 Unknown
3 No　　9 Refusal

>gen_health< "During >month_before<, how would you rate >first_name's< general state of health: excellent, good, average, fair or poor?"

1 Excellent　　5 Poor
2 Good　　8 Unknown
3 Average　　9 Refusal
4 Fair

>height_feet< "During that month, what was >his_her< approximate height?

In FEET"

__ 1-7
8 Unknown
9 Refusal

>height_inches< "and INCHES"

__ 0-11
98 Unknown
99 Refusal

>weight< "What was >his_her< approximate weight? (in pounds)"

____ 1-400
998 Unknown
999 Refusal

>hand< "Is >he_she< Right-handed, Left-handed or Ambidextrous?"

1 right handed　　8 Unknown
2 left handed　　9 Refusal
3 ambidextrous

>medication< "During >month_before<, did >Title< REGULARLY take ANY of the following medications? Regularly means DAILY for at LEAST ONE WEEK, or 3-4 TIMES per week during the month."

1 *Continue*

>allergies_med< “Antihistamines, or allergy medications, such as Actifed, Allerest, Allegra, Claritin or Benadryl?”

1 Yes
3 No
8 Unknown
9 Refusal

>prepain_med< “Prescription pain medication such as Tylenol #3, codeine, phenylbutazone, Darvocet, Lortab or Ansaid?”

1 Yes 8 Unknown
3 No 9 Refusal

>otcpain_med< “Over the counter (OTC) pain relievers, such as aspirin, Advil, Aleve, Orudis or Tylenol?”

1 Yes 8 Unknown
3 No 9 Refusal

>ritalin_med< “Ritalin or other medicine for treatment of hyperactivity?”

1 Yes 8 Unknown
3 No 9 Refusal

>heart_med< “Heart medication?

1 Yes 8 Unknown
3 No 9 Refusal

>blood_med< “Blood Pressure medications?”

1 Yes 8 Unknown
3 No 9 Refusal

>depress_med< “Anti-depressants / Mood elevators?”

1 Yes
3 No
8 Unknown
9 Refusal

>diet_med< “Amphetamines, decongestants, or pep pills, including diet pills?”
1 Yes
3 No
8 Unknown
9 Refusal

>insulin_med< “Insulin?”

1 Yes 8 Unknown
3 No 9 Refusal

>tranq_med< “Tranquilizers, sedatives, sleeping medications, such as Valium or

Diazepam?"

1 Yes — 8 Unknown
3 No — 9 Refusal

>antibiotics_med< "Antibiotics, such as penicillin, erythromycin, tetracycline or sulfa drugs?"

1 Yes — 8 Unknown
3 No — 9 Refusal

>diuretics_med< "Diuretics or water pills?"

1 Yes — 8 Unknown
3 No — 9 Refusal

>introduction14a< "The next questions are about >first_name's< sleep and exercise patterns during >month_before<."

1 *Continue*

>sleep1< "During that month, on average, how many hours of sleep did >he_she< get each night?"

__ 1-24 hours
98 Unknown
99 Refusal

>sleep2< "How often was it difficult for >him_her< to wake up on mornings >he_she< needed to be up for chores, work or school: never, sometimes, often or always?"

1	Never	4	Always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>sleep3< "How often was it difficult for >him_her< to go to sleep at night, such as taking more than an hour to get to sleep: never, sometimes, often or always?"

1	Never	4	Always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>exercise< "During >month_before<, did >Title< actively participate in any regular exercise at least 3 days a week, for twenty minutes or more, that made >him_her< sweat?"

1 Yes — 8 Unknown
3 No — 9 Refusal

>introduction15< "The next few questions ask about YOUR experience in strictness with >Title<. We recognize that parents differ in how strict they are with their children because of children's abilities at different ages.

Prior to >month<, how STRICT were you about the FOLLOWING: not strict, somewhat strict, moderately strict or very strict?"

1 *Continue*

>strict1< "Knowing where >he_she< was?"

1	Not Strict	7	N/A
2	Somewhat Strict	8	Unknown
3	Moderately Strict	9	Refusal
4	Very Strict		

>strict2< "Knowing who >he_she< was with when >he_she< was out?"

1	Not Strict	7	N/A
2	Somewhat Strict	8	Unknown
3	Moderately Strict	9	Refusal
4	Very Strict		

>strict3< "Making certain that >he_she< used a seatbelt or car seat when riding or driving in a car or other motor vehicle?"

1	Not Strict	7	N/A
2	Somewhat Strict	8	Unknown
3	Moderately Strict	9	Refusal
4	Very Strict		

>strict4< "Making certain that >he_she< used farm equipment safely?"

1	Not Strict	7	N/A
2	Somewhat Strict	8	Unknown
3	Moderately Strict	9	Refusal
4	Very Strict		

>strict5< "Making certain that >he_she< worked safely around animals?"

1	Not Strict	7	N/A
2	Somewhat Strict	8	Unknown
3	Moderately Strict	9	Refusal
4	Very Strict		

>e_ProgNote21< *[Programming Note: If (>age< < 5) go to* ***>introduction16b<****]*

>introduction16< "The next questions are about your perception of >first_name's< behaviors or actions during >month_before<. Choose the answer that best describes HOW OFTEN the following happened or WAS TRUE of >him_her< during that month. Would you say that >he_she< ALMOST NEVER, SOMETIMES, OFTEN or ALMOST ALWAYS..."

1 *Continue*

>complete< "Completed >his_her< work and chores?"

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>**followrules**< “Followed rules?”

1	Almost never
2	Sometimes
3	Often
4	Almost always
8	Unknown
9	Refusal

>**thinking**< “Acted without thinking?”

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>**fights**< “Got into fights?”

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>**hard**< “Worked hard?”

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>**impulse**< “Was impulsive?”

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>**broke**< “Broke rules?”

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>**careful**< “Liked to plan carefully before going ahead?”

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>**still**< “Couldn't sit still?”

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>**distract**< “Was easily distracted?”

1	Almost never	2	Sometimes

3	Often	8	Unknown
4	Almost always	9	Refusal

>cautious< "Was cautious?"

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>irritable< "Was irritable?"

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>runaway< "Left the house or farm without permission?"

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>attention< "Paid attention?"

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>sad< "Looked sad or down?"

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>bully< "Bullied or was mean to others?"

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>energy< "Had low energy?"

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>conc< "Had good concentration?"

1	Almost never	4	Almost always
2	Sometimes	8	Unknown
3	Often	9	Refusal

>introduction16b< "The next questions are about stress >Title<, you and the rest of your family experienced during the three months PRIOR TO >month<: NOT STRESSFUL, SOMEWHAT STRESSFUL, MODERATELY

STRESSFUL or VERY STRESSFUL."

1 *Continue*

>stress1< "During that period, how stressful did you feel life was for >Title<?"

1	Not stressful	4	Very stressful
2	Somewhat stressful	8	Unknown
3	Moderately stressful	9	Refusal

>stress2< "How stressful did you feel life was for you?"

1	Not stressful	4	Very stressful
2	Somewhat stressful	8	Unknown
3	Moderately stressful	9	Refusal

>stress3< "How stressful did you feel life was for your family?"

1	Not stressful	4	Very stressful
2	Somewhat stressful	8	Unknown
3	Moderately stressful	9	Refusal

>introduction17< "The next questions are about children and their abilities as they mature. When you are deciding whether a child is READY to do a new chore on the farm or ranch, HOW IMPORTANT are each of the following in making that decision? NOT IMPORTANT, SOMEWHAT IMPORTANT, MODERATELY IMPORTANT or VERY IMPORTANT?"

1 *Continue*

>ready1< "How important is the child's age?"

1	Not important	4	Very important
2	Somewhat important	8	Unknown
3	Moderately important	9	Refusal

>ready2< "The size of the child?"

1	Not important	4	Very important
2	Somewhat important	8	Unknown
3	Moderately important	9	Refusal

>ready3< "Whether the child is a boy or a girl?"

1	Not important	8	Unknown
2	Somewhat important	9	Refusal
3	Moderately important		
4	Very important		

>ready4< "The maturity of the child, or how responsible the child is?"

1 Not important
2 Somewhat important
3 Moderately important
4 Very important

8 Unknown
9 Refusal

>ready5< "How important are the skills of the child?"

1	Not important	4	Very important
2	Somewhat important	8	Unknown
3	Moderately important	9	Refusal

>ready6< "The danger level of the task, or new chore?"

1	Not important	4	Very important
2	Somewhat important	8	Unknown
3	Moderately important	9	Refusal

>ready7< "Prior formal training of the child, such as 4-H or Vo-Ag training?"

1	Not important	4	Very important
2	Somewhat important	8	Unknown
3	Moderately important	9	Refusal

>ready8< "Other training of the child, by people involved in YOUR operation?"

1	Not important	8	Unknown
2	Somewhat important	9	Refusal
3	Moderately important		
4	Very important		

>ready_othr< "Are there any other characteristics about a child that you consider important in deciding if they are ready for a new chore?"

1	Yes	8	Unknown *(go to **>safety1<**)*
3	No *(go to **>safety1<**)*	9	Refusal *(go to **>safety1<**)*

>ready_specify< "Please specify." ______________________________

>safety1< "In your opinion, at what age would an average young person be ready to work with animals (including beef cattle, dairy cattle and swine)--- feeding, cleaning, etc.?"

__ 0-19 years
98 Unknown
99 Refusal

>safety2< "At what age would a child be ready to ride on or in a tractor?"

__ 0-19 years
98 Unknown
99 Refusal

>safety3< "At what age would a child be ready to drive or operate a tractor?"

__ 0-19 years
98 Unknown
99 Refusal

>introduction18< “Next I would like to ask about chores or farmwork >Title< may have performed on YOUR farming or ranching operation, during >month_before<.”

1 *Continue*

>chores_many< “During that month, would you say that >he_she< did as many chores or farmwork as were expected by the family, more chores or less chores than were expected?”

0 N/A – None were expected *(go to **>introduction19<**)*
1 Did less than expected
2 Did about what was expected
3 Did more than expected
8 Unknown
9 Refusal

>chores_well< “How well would you say that >he_she< performed the chores or farmwork that were expected by the family? Better than expected, about what was expected or worse than expected?”

1 Did worse than expected
2 Did about what was expected
3 Did better than expected
8 Unknown
9 Refusal

>introduction19< “The next few questions are about YOUR farming or ranching operation.”

1 *Continue*

>farming1< “Prior to >month<, how many years had you been farming or ranching?”

0 < 0 year
__ 1-90 years
98 Unknown
99 Refusal

>acres< "During >month_before<, of the acres that you own, plus the acres that you rent or lease, how many did you have in use or active production, including land in hay and pasture? Do not include wasteland, woodlands, or land in long term CRP (Conservation Reserve Programs) or any set aside programs."

_____	0-99,997
99998	Unknown
99999	Refusal

>enterpr< "During >month_before<, of the following farm enterprises, which ONE required the MOST amount of WORK TIME on your farm or ranch?" *[Enumerator: Read list of possible answers.]*

1 Beef cattle *(go to **>roadways<**)*
2 Dairy cattle *(go to **>roadways<**)*
3 Other animals (i.e. poultry, sheep, swine, horses, etc.) *(go to **>roadways<**)*
4 Field, forage or specialty crops *(go to **>roadways<**)*
5 CRP (Conservation Reserve Program) or Set-aside program *(go to **>roadways<**)*
6 Other
8 Unknown *(go to **>roadways<**)*
9 Refusal *(go to **>roadways<**)*

>enterpr_specify< "Specify other." ________________________________

>roadways< "During that month, did anyone involved in your operation travel on public roadways with farm equipment? Public roadways refers to township, county and state roads. Field roads or private roads should not be considered public roadways."

1 Yes 8 Unknown
3 No 9 Refusal

>milking1< "During >month_before<, did you have any type of milking system in use?"

1 Yes 8 Unknown *(go to **>firearms1<**)*
3 No *(go to **>firearms1<**)* Refusal *(go to **>firearms1<**)*

>milking2< "What type?

1 Automatic Pipeline Washing System (Clean in Place – CIP) *(go to **>firearms1<**)*
2 Bucket/Manual System (Open) *(go to **>firearms1<**)*
3 Other
8 Unknown *(go to **>firearms1<**)*
9 Refusal *(go to **>firearms1<**)*

>milking_specify< "Please specify." ________________________________

>firearms1< "During >month_before<, were there any firearms present on your operation?"

1 Yes 3 No *(go to **>income<**)*

8 Unknown *(go to **>income<**)* 9 Refusal *(go to **>income<**)*

>firearms2< "How many were shotguns?"

__ 0-97
98 Unknown
99 Refusal

firearms3< "How many were rifles?"

__ 0-97
98 Unknown
99 Refusal

>firearms4< "How many were handguns?"

__ 0-97
98 Unknown
99 Refusal

>enterpr< "Please estimate your 2000 net household income, after taxes, from all sources. Would it be:" *[Enumerator: Read list of possible answers.]*

1 Less than $15,000
2 $15,000 - $29,999
3 $30,000 - $49,999
4 $50,000 - $99,999
5 $100,000 - $174,999
6 $175,000 - $249,999
7 $250,000 or more
8 Unknown
9 Refusal

>prevent1< "Do you believe that some farming or ranching operation-related injuries can be prevented?"

1 Yes 8 Unknown *(go to **>intro<**)*
3 No *(go to **>prevent3<**)* Refusal *(go to **>intro<**)*

>prevent2< "What are the two main things you think can be done to prevent injuries that occur on the farm or ranch?" *[Enumerator: **Type response exactly as stated + end with ///**. After entering information, press ESC to continue with interview.]*

____

*(go to **>intro<**)*

>prevent3< "Why is it that you feel they can't be prevented?" *[Enumerator: **Type response exactly as stated + end with ///**. After entering information, press ESC to continue with interview.]*

____

*(go to **>intro<**)*

Exposure Section – Part II

Respondent Selection Process

>intro< "In the next series of questions, I will be asking questions about selected people who HAD AN INJURY BETWEEN JANUARY 1st, 2001 and JUNE 30, 2001 as well as selected people who DID NOT HAVE AN INJURY during that period. This will provide important information on factors that may either cause an injury or protect people from injury and can be used to develop effective prevention programs."

>e_ProgNote22< *[Programming Note: Set* ***>Exp_Resp<*** *= >Cur_Resp<]*
If (>Age< ≥ 12 years old)
go to ***>child_permission<***
Else If (>Exp_Resp< = 2)
go to ***>Introduction>***
Else
go to ***>best_respondent1<***
End If]

>child_permission< "May I speak with >Title< to ask some questions about >his_her< activities on the farm or ranch? The interview should take approximately 20 minutes."

1 Yes *(go to* ***>inf_consent4a<****)*
3 No
5 Parent agrees, but child is not available *(go to* ***>callback<****)*

>e_ProgNote23< *[Programming Note: If (>Exp_Resp< not equal 2) go to* ***>best_respondent2<****)*

>cont_resp< "In that case, we would like to ask you the remaining questions. You can have someone else assist with the answers, if you wish."

1 *go to* ***>Introduction<***

>best_respondent1< "We would like to speak with the adult in your household who knows the most about >first_name's< farming or ranching related activities and how many hours >he_she< spent on these activities during >month_before<. Would that be you or the male head of household?"

1 Current respondent – Female head of household *(go to* ***> Introduction<****)*
3 Male head of household *(go to* ***>get_other<****)*
5 Someone Else *(go to* ***>want_HH<****)*
9 Refusal *(go to* ***>exp_end2<****)*

>best_respondent2< "In that case, we would like to speak with the adult in your household who knows the most about >first_name's< farming or ranching related activities and how many hours >he_she< spent on these activities during >month_before<. Would that be you or the male head of household?"

1 Current respondent – Female head of household *(go to > **Introduction<**)*
3 Male head of household *(go to **>get_other<**)*
5 Someone Else *(go to **>want_HH<**)*

>want_HH< "We prefer to ask these questions only of the female head of household or the male head of household, but you can certainly have someone else assist with the answers. Can you continue with these questions, or should I speak with the male head of household?"

1 Continue with current respondent – Female head of household *(go to > **Introduction<**)*
3 Male head of household *(go to **>get_other<**)*
9 Refusal *(go to **>exp_end2<**)*

>get_other< "Is he available now to answer questions?" ("May I speak with him?")

1 Yes, he comes to the phone *(go to **>inf_consent5a<**)*
3 No, he's not willing to answer *(go to **>cont_resp<**)*
5 No, he's not available

>willing< "Since he's not available to answer these questions now, would you be willing to try to answer these questions for us? You can have someone else assist with the answers, if you wish."

1 Yes *(go to > **Introduction<**)*
3 No *(go to **>callback<**)*
9 Refusal *(go to **>exp_end2<**)*

>inf_consent4a< "Hello, this is >EnumName< calling for the >StateName< Agricultural Statistics Service. We are conducting a project with the University of Minnesota on farming and ranching operations. >Who_Pi< agreed to have your household participate in this project and has been answering questions about who resides in your household, some characteristics of your operation and any injuries that may have occurred."

1 *Continue*

>inf_consent4b< "We would like to ask you some questions about your activities on your farming or ranching operation. You do not have to answer these questions but your cooperation is important for us to get accurate information. If you are uncomfortable with any question, you may choose not to answer that one, and we will move on to the next question. All the information we collect is confidential. Would you be willing to help us by answering some questions about your activities on the farm or ranch?"

1 Yes *[Set: >Exp_Resp2< = 3;(go to **>Introduction<**)]*
3 No [If (>Age< ≥ 18) *go to **>reasonc<**]*

>HHLog_back< "Would you be able to put >Who_Pi< back on the phone so I may speak with him/her?"

1 Yes, prior respondent comes back
3 No *(go to **>callback<**)*

>HHLog_again< ">Title< has requested not to be interviewed."

1 *go to **>best_respondent2<***

>reasonc< "May I ask why you prefer not to continue at this time?"

1 Doesn't have time now *(go to **>callback<**)*
2 Isn't comfortable with the questions (*go to **>reconsider5c<***)
3 Can't see the value of the interview (*go to **>reconsider6c<***)
4 No clear reason, just refuses (*go to **>reconsider7c<***)

>reconsider5c< "If you are uncomfortable with any question, we can skip that one and go on to another. Would you be willing to continue if we skip the questions you prefer not to answer?"

1 Yes *[Set: >Exp_Resp< = 3;(go to **>Introduction<**)]*
3 No (*go to **>exp_end2<***)

>reconsider6c< "The results of this project will be used to develop effective injury prevention programs that will benefit all farming and ranching households. It is important that we interview all eligible housholds, whether or not there were any injuries. This will provide important information about factors that may prevent injuries. May we continue?"

1 Yes *[Set: >Exp_Resp2< = 3;(go to **>Introduction<**)]*
3 No (*go to **>exp_end2<***)

>reconsider7c< "The results of this project will be used to develop effective injury prevention programs that will benefit all farming and ranching households. It is important that we interview all eligible housholds, whether or not there were any injuries. This will provide important information about factors that may prevent injuries.If you are uncomfortable with any question, we can skip that one and go on to another. Or we can call back at a time that is more convenient. May we continue, or would you prefer that we call back?"

1 Yes, continue *[Set: >Exp_Resp2< = 3;(go to **>Introduction<**)]*
3 No, refuses to continue (*go to **>exp_end2<***)
5 Schedule a callback (*go to **>callback<***)

>inf_consent5a< "Hello, this is >EnumName< calling for the >StateName< Agricultural Statistics Service. We are conducting a project with the University of Minnesota on farming and ranching operations.

>Who_Pi< agreed to have your household participate in this project and has been answering questions about who resides in yur household, some characteristics of your operation and any injuries that may have occurred."

1 *Continue*

>inf_consent5b< "We would like to ask some questions about >first_name's< activities on your farming or ranching operation. You do not have to answer these questions but your cooperation is important for us to get accurate information. If you are uncomfortable with any question, you may choose not to answer that one, and we will move on to the next question. All the information we collect is confidential. Would you be willing to help us by answering some questions about >first_name's< activities on the farm or ranch?"

1 Yes *[Set: >Exp_Resp2< = 2;(go to **>Introduction<**)]*
3 No

>HHLog_back2< "Would you be able to put >Who_Pi< back on the phone so I may speak with him/her?"

1 Yes, prior respondent comes back
3 No *(go to **>callback<**)*

>HHLog_again2< ">Title< has requested not to be interviewed."

1 *go to **>cont_resp<***

Exposure Section – Part II

Interview

>introduction< “In this section we would like to ask some questions about chores or work >Title< did. These questions relate specifically to FARMWORK, and by farmwork I mean any activities connected with your farming or ranching operation, either on or off the farm/ranch, including driving to town to get supplies. This will also include information about working with animals, driving vehicles, operating farm machinery and other tasks. Some of the questions will be general, while others will ask about a certain month of the year.”

1 *Continue*

>farmwork< “During >month_before<, did >Title< work in any type of activities or do chores related to YOUR operation?”

1	Yes	8	Unknown *(go to **>othrfarm<**)*
3	No *(go to **>othrfarm<**)*		Refusal *(go to **>othrfarm<**)*

>wks_farmwork< “During that month, HOW MANY WEEKS did >he_she< work on these activities?”

__ 1-4 weeks
8 Unknown
9 Refusal

>hrs_farmwork< “On average, how many HOURS PER WEEK?”

____ 1-130 hours
998 Unknown
999 Refusal

>othrfarm< “During >month_before<, did >Title< work in any type of activities or do chores related to SOMEONE ELSE'S farming or ranching operation?”

1	Yes	8	Unknown *(go to **>e_ProgNote24<**)*
3	No *(go to **>e_ProgNote24<**)*		Refusal *(go to **>e_ProgNote24<**)*

>wks_othrfarm< “During that month, HOW MANY WEEKS did >he_she< work on these activities?”

__ 1-4 weeks
8 Unknown
9 Refusal

>hrs_othrfarm< “On average, how many HOURS PER WEEK?”

____ 1-130 hours
998 Unknown
999 Refusal

>e_ProgNote24< *[Programming Note: If (>farmwork< not equal 1) go to* ***>bystanding1<****]*

>introduction2< “The following questions are about work or chores >Title< did with animals on YOUR farming or ranching operation during >month_before<.”

1 *Continue*

>animals< “During that month, did >he_she< work or do chores with ANY TYPE of animals?”

1 Yes
3 No *(go to* ***>bystanding1<****)*
8 Unknown *(go to* ***>bystanding1<****)*
9 Refusal *(go to* ***>bystanding1<****)*

>dairy< “Did >he_she< work or do chores with any type of dairy cattle? (Do not include dairy steers.)”

1 Yes
3 No *(go to* ***>beef<****)*
8 Unknown *(go to* ***>beef<****)*
9 Refusal *(go to* ***>beef<****)*

>dairy1< “Which of the following types of dairy cattle did >he_she< work with:

A dairy cow with it's newborn calf or calves?”

1 Yes
3 No
8 Unknown
9 Refusal

>dairy2< “A dairy calf away from it's mother?”

1 Yes
3 No
8 Unknown
9 Refusal

>dairy3< “Dairy bulls?”

1 Yes
3 No
8 Unknown
9 Refusal

>dairy4< “Dairy cows or heifers?”

1 Yes
3 No
8 Unknown
9 Refusal

>act1_dairy< “The next questions are about >his_her< activities when working with dairy cattle on YOUR operation. During >month_before<, which of the following did >he_she< do:

Feed the dairy cattle?”

1 Yes
3 No *(go to* ***>act2_dairy<****)*
8 Unknown *(go to* ***>act2_dairy<****)*

9 Refusal *(go to **>act2_dairy<**)*

>wks1_dairy< “For HOW MANY WEEKS?”

__ 1-4 weeks
8 Unknown
9 Refusal

>hrs1_dairy< “On average, how many HOURS PER WEEK?”

____ 1-130 hours
998 Unknown
999 Refusal

>act2_dairy< “Did >he_she< milk the cows?”

1	Yes	8	Unknown *(go to **>act3_dairy<**)*
3	No *(go to **>act3_dairy<**)*	9	Refusal *(go to **>act3_dairy<**)*

>wks2_dairy< “For HOW MANY WEEKS?”

__ 1-4 weeks
8 Unknown
9 Refusal

>hrs2_dairy< “On average, how many HOURS PER WEEK?”

____ 1-130 hours
998 Unknown
999 Refusal

>act3_dairy< “Did >he_she< clean inside the barn, including the stalls?”

1	Yes	8	Unknown *(go to **>act4_dairy<**)*
3	No *(go to **>act4_dairy<**)*	9	Refusal *(go to **>act4_dairy<**)*

>wks3_dairy< “For HOW MANY WEEKS?”

__ 1-4 weeks
8 Unknown
9 Refusal

>hrs3_dairy< “On average, how many HOURS PER WEEK?”

____ 1-130 hours
998 Unknown
999 Refusal

>act4_dairy$_i$< “Which of the following OTHER activities did >he_she< do with dairy cattle?” *[Enumerator: Read list of possible answers]*

0	None	4	Giving medical treatments, including injections
1	Calving		
2	Footwork	5	Dehorning
3	Herding, moving, loading, or unloading cattle	6	Branding

7 Butchering
8 Castration
9 Other

98 Unknown
99 Refusal

>e_ProgNote25< *[Programming Note:*
If (>act4_dairy$_1$< = 0)
go to ***>beef<***
Else If (>act4_dairy$_1$< = 9 or >act4_dairy$_2$< = 9 or >act4_dairy$_3$< = 9 or >act4_dairy$_4$< = 9 or >act4_dairy$_5$< = 9 or >act4_dairy$_6$< = 9 or >act4_dairy$_7$< = 9 or >act4_dairy$_8$< = 9 or >act4_dairy$_9$< = 9)
go to ***>act_dairy_specify<***
Else
go to ***>wks4_dairy<***
End If]

>act_dairy_specify< "Specify other activity."

____

>wks4_dairy< "During that month, HOW MANY WEEKS did >he_she< do any of these OTHER activities, with the dairy cattle?"

__ 1-4 weeks
8 Unknown
9 Refusal

>hrs4_dairy< "On average, how many HOURS PER WEEK?"

____ 1-130 hours
998 Unknown
999 Refusal

>beef< "During >month_before<, did >Title< work or do chores with any type of beef cattle, including dairy steers, on YOUR operation?"

1 Yes
3 No *(go to* ***>swine<****)*
8 Unknown *(go to* ***>swine<****)*
9 Refusal *(go to* ***>swine<****)*

>beef1< "Which of the following types of beef cattle did >he_she< work with:

A beef cow with it's newborn calf or calves?"

1 Yes
3 No
8 Unknown
9 Refusal

>beef2< "A beef calf away from it's mother?"

1 Yes
3 No
8 Unknown
9 Refusal

>beef3< "Beef bulls?"

1 Yes
3 No
8 Unknown
9 Refusal

>beef4< "Beef cows or heifers?"

1	Yes	8	Unknown
3	No	9	Refusal

>beef5< "Steers, including both dairy and beef steers?"

1	Yes	8	Unknown
3	No	9	Refusal

>act1_beef< "The next questions are about >his_her< activities when working with beef cattle on YOUR operation. During >month_before<:

Did >he_she< feed the beef cattle?"

1	Yes	8	Unknown
3	No	9	Refusal

>act3_beef$_{i}$< "Which of the following OTHER activities did >he_she< do with the beef cattle?" *[Enumerator: Read list of possible answers]*

0	None	6	Branding
1	Calving	7	Butchering
2	Footwork	8	Castration
3	Herding, moving, loading, or unloading cattle	9	Other
4	Giving medical treatments, including injections	98	Unknown
5	Dehorning	99	Refusal

>e_ProgNote26< *[Programming Note:*

If (>act3_beef$_{1}$< = 9 or >act3_beef$_{2}$< = 9 or >act3_beef$_{3}$< = 9 or >act3_beef$_{4}$< = 9 or >act3_beef$_{5}$< = 9 or >act3_beef$_{6}$< = 9 or >act3_beef$_{7}$< = 9 or >act3_beef$_{8}$< = 9 or >act3_beef$_{9}$< = 9)

go to ***>act_beef_specify<***

Else

go to ***>wks_beef<***

End If]

>act_beef_specify< "Specify other activity."

____

>wks_beef< "During that month, HOW MANY WEEKS did >he_she< do any activities with the beef cattle?"

__ 1-4 weeks
8 Unknown
9 Refusal

>hrs_beef< "On average, how many HOURS PER WEEK?"

____ 1-130 hours
998 Unknown

999 Refusal

>swine< "During >month_before<, did >Title< work or do chores with any type of swine or pigs, on YOUR operation?"

1 Yes
3 No *(go to **>othranimal<**)*
8 Unknown *(go to **>othranimal<**)*
9 Refusal *(go to **>othranimal<**)*

>swine_1< "Which of the following types of swine did >he_she< work with:

Sows with piglets?"

1 Yes
3 No
8 Unknown
9 Refusal

>swine_2< "Sows without piglets / gilt?"

1 Yes
3 No
8 Unknown
9 Refusal

>swine_3< "Feeder pigs?"

1 Yes
3 No
8 Unknown
9 Refusal

>swine_4< "Boars?"

1 Yes
3 No
8 Unknown
9 Refusal

>act1_swine< "The next questions are about >his_her< activities when working with swine on YOUR operation. During >month_before<, did >he_she<:

Feed the swine?"

1 Yes
3 No
8 Unknown
9 Refusal

>act2_swine< "Clean the pens or crates?"

1 Yes
3 No
8 Unknown
9 Refusal

>act3_swine< "Move, load or unload the swine?"

1 Yes
3 No
8 Unknown
9 Refusal

>act4_swine$_i$< "Which of the following OTHER activities did >he_she< do with the swine:" *[Enumerator: Read list of possible answers]*

0 None
1 Giving medical treatments, including injections
2 Butchering
3 Castration
4 Other
8 Unknown
9 Refusal

>e_ProgNote27< *[Programming Note:*
If (>act4_swine$_1$< = 4 or >act4_swine$_2$< = 4 or >act4_swine$_3$< = 4 or >act4_swine$_4$< = 4)
go to ***>act_swine_specify<***
Else
go to ***>wks_swine<***
End If]

>act_swine_specify< "Specify other activity."

____

>wks_swine< "During that month, HOW MANY WEEKS did >he_she< do any activities with the swine?"

__ 1-4 weeks
8 Unknown
9 Refusal

>hrs_swine< "On average, how many HOURS PER WEEK?"

____ 1-130 hours
998 Unknown
999 Refusal

>othranimal< "During >month_before<, did >Title< work or do chores with any other type of livestock or animals, including horses, sheep, or poultry, on YOUR operation?"

1 Yes
3 No *(go to* ***>riskanimal<****)*
8 Unknown *(go to* ***>riskanimal<****)*
9 Refusal *(go to* ***>riskanimal<****)*

>horse< "Did >he_she< work with any horses?"

1 Yes
3 No *(go to* ***>sheep<****)*
8 Unknown *(go to* ***>sheep<****)*
9 Refusal *(go to* ***>sheep<****)*

>horse_1< "Did >he_she< work with stallions or stud horses?"

1 Yes
3 No
8 Unknown
9 Refusal

>othrhorse< "Did >he_she< work with any other types of horses?"

1 Yes
3 No
8 Unknown
9 Refusal

>wks_horse< "During that month, HOW MANY WEEKS did >he_she< work with the horses?"

__ 1-4 weeks
8 Unknown
9 Refusal

>hrs_horse< "On average, how many HOURS PER WEEK?"

____ 1-130 hours
998 Unknown
999 Refusal

>sheep< "During >month_before<, did >he_she< work with any sheep on YOUR operation?"

1 Yes
3 No *(go to **>poultry<**)*
8 Unknown *(go to **>poultry<**)*
9 Refusal *(go to **>poultry<**)*

>wks_sheep< "During that month, HOW MANY WEEKS did >he_she< work with the sheep?"

__ 1-4 weeks
8 Unknown
9 Refusal

>hrs_horse< "On average, how many HOURS PER WEEK?"

____ 1-130 hours
998 Unknown
999 Refusal

>poultry< "Did >he_she< work with any poultry?"

1 Yes
3 No *(go to **>riskanimal<**)*
8 Unknown *(go to **>riskanimal<**)*
9 Refusal *(go to **>riskanimal<**)*

>wks_poultry< "During that month, HOW MANY WEEKS did >he_she< work with the poultry?"

__ 1-4 weeks
8 Unknown
9 Refusal

>hrs_poultry< "On average, how many HOURS PER WEEK?"

____ 1-130 hours
998 Unknown
999 Refusal

>riskanimal< "PRIOR to >month<, how much risk of injury did you believe there was for >Title< when working with animals on YOUR operation? No risk, some risk, moderate risk, or a lot of risk"

1	No risk	4	A lot of risk
2	Some risk	8	Unknown
3	Moderate risk	9	Refusal

>bystanding1< "During >month_before<, how often >was_were< >he_she< watching activities, playing or standing around, but not working, in buildings or areas where animals were kept? Never, sometimes, or frequently?"

1	Never	8	Unknown
2	Sometimes	9	Refusal
3	Frequently		

>e_ProgNote28< *[Programming Note:*
If (>farmwork< not equal 1)
go to ***>bystanding5<***
Else If (>Age< < 5)
go to ***>introduction3b<***
End If]

>introduction3a< "In the following questions I will be asking if, during >month_before<, >Title< operated or rode, IN OR ON, any motor vehicles, FOR ACTIVITIES DIRECTLY RELATED TO YOUR FARMING OR RANCHING OPERATION."

1 *Continue*

>motorveh1< "During that month, did >he_she< operate a car, van, sport utility vehicle, pickup truck, grain truck or other truck?"

1	Yes	8	Unknown *(go to* ***>vehride1<****)*
3	No *(go to* ***>vehride1<****)*	9	Refusal *(go to* ***>vehride1<****)*

>wks_motorveh1< "For HOW MANY WEEKS did >he_she< operate any of these vehicles?"

__ 1-4 weeks
8 Unknown
9 Refusal

>hrs_motorveh1< "On average, how many HOURS PER WEEK?"

____ 1-130 hours *(go to* ***>vehride1<****)*
998 Unknown *(go to* ***>vehride1<****)*

999 Refusal *(go to* ***>vehride1<****)*

>introduction3b< "In the following questions I will be asking if, during >month_before<, >Title< rode, IN OR ON, any motor vehicles, FOR ACTIVITIES DIRECTLY RELATED TO YOUR FARMING OR RANCHING OPERATION."

1 *Continue*

>vehride1< "Did >he_she< ride as a passenger in a car, van, sport utility vehicle, pickup truck, grain truck or other truck?"

1 Yes
3 No *(go to* ***>e_ProgNote29<****)*
8 Unknown *(go to* ***>e_ProgNote29<****)*
9 Refusal *(go to* ***>e_ProgNote29<****)*

>wks_vehride1< "For HOW MANY WEEKS did >he_she< ride in any of these vehicles?"

__ 1-4 weeks
8 Unknown
9 Refusal

>hrs_vehride1< "On average, how many HOURS PER WEEK?"

____ 1-130 hours
998 Unknown
999 Refusal

>e_ProgNote29< *[Programming Note:*
If (>motorveh1< not equal 1 and >vehride1< not equal 1)
go to ***>motorveh2<***
Else If (>Age< ≥ 5)
go to ***>seatbelt2<***
End If]

>seatbelt1< "When they rode in one of these vehicles, how often did they wear a seatbelt or use a car safety seat? Never, seldom, sometimes, nearly always or always?"

1 Never *(go to **>motorveh2<**)*
2 Seldom *(go to > **>motorveh2<**)*
3 Sometimes *(go to **>motorveh1<**)*
4 Nearly always *(go to **>motorveh2<**)*
5 Always *(go to **>motorveh2<**)*
8 Unknown *(go to > **>motorveh2<**)*
9 Refusal *(go to > **>motorveh2<**)*

>seatbelt2< "When >he_she< operated or rode in one of these vehicles, how often did >he_she< wear a seatbelt? Never, seldom, sometimes, nearly always or always?"

1 Never
2 Seldom
3 Sometimes
4 Nearly always
5 Always
8 Unknown
9 Refusal

>motorveh2< "During >month_before<, did >he_she< operate or ride on a motorcycle, all terrain vehicle (ATV or ATC) or snowmobile?"

1 Yes
3 No *(go to **>bystanding5<**)*
8 Unknown *(go to **>bystanding5<**)*
9 Refusal *(go to **>bystanding5<**)*

>wks_motorveh2 "During that month, HOW MANY WEEKS did >he_she< operate or ride on any of these vehicles?"

__ 1-4 weeks
8 Unknown
9 Refusal

>hrs_motorveh2< "On average, how many HOURS PER WEEK?"

____ 1-130 hours
998 Unknown
999 Refusal

>helmet< "When they operated or rode in ANY of these vehicles, how often did they wear a helmet? Never, seldom, sometimes, nearly, always or always?"

1 Never
2 Seldom
3 Sometimes
4 Nearly always
5 Always
8 Unknown
9 Refusal

>bystanding5< "During >month_before<, how often >was_were< >he_she< watching activities, playing or standing around, but not working, in the driveway. Never, sometimes or frequently?"

1 Never
2 Sometimes
3 Frequently
8 Unknown

9 Refusal

>e_ProgNote30< *[Programming Note: If (>farmwork< not equal 1 or >Age< <5) go to* ***>introduction5<****]*

>introduction4< "Now I will ask about work or chores >Title< did with large farm machinery, on YOUR farming or ranching operation, during >month_before<. By large machinery I mean tractors, tillage equipment, and other farm implements."

1 *Continue*

>tractor1< "During that month, did >he_she< operate any tractors greater than 20 horsepower, on your farming or ranching operation?"

1 Yes	8 Unknown
3 No	9 Refusal

>tractor2< "Did >he_she< operate any tractors 20 horsepower or less, on your farming or ranching operation? This does not include skid steer tractors?"

1 Yes	8 Unknown
3 No	9 Refusal

>e_ProgNote31< *[Programming Note: If (>tractor1< not equal 1 and >tractor2< not equal 1) go to* ***>tractor3<****]*

>tractor1_many< "How many of either of these tractors did >he_she< operate?"

__ 1-10 hours
98 Unknown
99 Refusal

>tractor1_wks "During that month, HOW MANY WEEKS did >he_she< operate EITHER of these types of tractors?"

__ 1-4 weeks
8 Unknown
9 Refusal

>tractor1_hrs< "On average, how many HOURS PER WEEK?"

____ 1-130 hours
998 Unknown
999 Refusal

>tractor1_PTO< "Did ANY of the tractors have a Power-Take-Off?"

1 Yes	8 Unknown *(go to* ***>tractor1_ROPS<****)*
3 No *(go to* ***>tractor1_ROPS<****)*	9 Refusal *(go to* ***>tractor1_ROPS<****)*

>tractor1_shield< "Did ALL of THESE have a PTO shield in place when >he_she< used it?"

1 Yes
3 No
8 Unknown
9 Refusal

>tractor1_PTOdrive< "Did ANY of the tractors use a PTO to drive another piece of equipment?"
1 Yes
3 No
8 Unknown
9 Refusal

>tractor1_conn< Did >he_she< connect an implement to ANY of the PTOs?"

1 Yes 8 Unknown
3 No 9 Refusal

>tractor1_ROPS< "Did ALL of the tractors have an approved Roll Over Protective Structure? This could include a 2 or 4 post frame or a cab with a built-in ROP structure."

1 Yes 8 Unknown
3 No 9 Refusal

>tractor3< "During >month_before<, did >he_she< operate ANY skid steer tractors, such as a Bobcat?"

1 Yes
3 No *(go to* ***>e_ProgNote32<****)*
8 Unknown *(go to* ***>e_ProgNote32<****)*
9 Refusal *(go to* ***>e_ProgNote32<****)*

>tractor3_wks "During that month, HOW MANY WEEKS did >he_she< operate this type of tractor?"

__ 1-4 weeks
8 Unknown
9 Refusal

>tractor3_hrs< "On average, how many HOURS PER WEEK?"

____ 1-130 hours
998 Unknown
999 Refusal

>e_ProgNote32< *[Programming Note: If (>tractor1< not equal 1 and >tractor2< not equal 1 and >tractor3< not equal 1) go to* ***>introduction5<****]*

>tractor_age< “At what age did >Title< begin to drive or operate any type of tractor on your operation?”

__ 1-19
98 Unknown
99 Refusal

>introduction5< “In the following questions, I will ask about time >Title< spent RIDING ON a tractor, as a passenger or as a helper, on YOUR farming or ranching operation, during >month_before<.”

1 *Continue*

>ride_tractor< “During that month, did >he_she< ride on/in ANY type of tractor as a passenger or helper?”

1 Yes
3 No *(go to **>e_ProgNote35<**)*
8 Unknown *(go to **>e_ProgNote35<**)*
9 Refusal *(go to **>e_ProgNote35<**)*

>ridetractor1< “Did >he_she< ride on/in any tractor greater than 20 horsepower?”

1 Yes
3 No
8 Unknown
9 Refusal

>ridetractor2< “During >month_before<, did >Title< ride on/in any tractor 20 Horsepower or less?”

1 Yes
3 No
8 Unknown
9 Refusal

>e_ProgNote33< *[Programming Note: If (>ridetractor1< not equal 1 and >ridetractor2< not equal 1) go to **>ridetractor3<**]*

>ridetractor1_wks “During that month, HOW MANY WEEKS did >he_she< ride on EITHER of these types of tractors?”

__ 1-4 weeks
8 Unknown
9 Refusal

>ridetractor1_hrs< “On average, how many HOURS PER WEEK?”

____ 1-130 hours
998 Unknown
999 Refusal

>ride1_cab< “Did ALL of the tractors have an approved Roll Over Protective Structure? This could include a 2 or 4 post frame or a cab with a built-in ROP structure.”

1 Yes
3 No
8 Unknown
9 Refusal

>ride1_impl1< "Was an implement connected to any of the tractors?"

1 Yes
3 No *(go to **>ridetractor3<**)*
8 Unknown *(go to **>ridetractor3<**)*
9 Refusal *(go to **>ridetractor3<**)*

>ride1_impl2< "Did >he_she< ride on any of the implements connected to the tractors?"

1 Yes
3 No
8 Unknown
9 Refusal

>ridetractor3< "During >month_before<, did >Title< ride on any skid steer tractor, such as a Bobcat?"

1 Yes
3 No *(go to **>e_ProgNote34<**)*
8 Unknown *(go to **>e_ProgNote34<**)*
9 Refusal *(go to **>e_ProgNote34<**)*

>ridetractor3_wks "During that month, HOW MANY WEEKS did >he_she< ride on/in this type of tractor?"

__ 1-4 weeks
8 Unknown
9 Refusal

>ridetractor3_hrs< "On average, how many HOURS PER WEEK?"

____ 1-130 hours
998 Unknown
999 Refusal

>e_ProgNote34< *[Programming Note: If (>ridetractor1< not equal 1 and >ridetractor2< not equal 1 and >ridetractor3< not equal 1) go to **e_ProgNote34a<**]*

>tractor_age2< "At what age did >Title< begin to ride on/in ANY type of tractor on YOUR operation?"

__ 1-19
98 Unknown
99 Refusal

>e_ProgNote34a< *[Programming Note: If (>tractor1< not equal 1 and >tractor2< not equal 1 and >tractor3< not equal 1 and >ridetractor1< not equal 1 and >ridetractor2< not equal 1 and >ridetractor3< not equal 1) go to **e_ProgNote35<**]*

>tractor_risk< "PRIOR to >month<, how much risk of injury did you believe there was for >Title< when RIDING ON OR WORKING WITH tractors on YOUR operation? No risk, some risk, moderate risk, or a lot of risk"

1 No risk
2 Some risk

3 Moderate risk
4 A lot of risk
8 Unknown
9 Refusal

>e_ProgNote35< *[Programming Note:*

If (>Age< < 5)
go to ***>bystanding3<***
Else if (If (>tractor1< not equal 1 and >tractor2< not equal 1 and >tractor3< not equal 1)
go to ***>e_ProgNote35a<***
End if]

>training1< "PRIOR to >month<, did >month< ever take a 4-H or Vo-Ag training program to learn to operate a tractor?"

1 Yes
3 No *(go to* ***>e_ProgNote35a<****)*
8 Unknown *(go to* ***>e_ProgNote35a<****)*
9 Refusal *(go to* ***>e_ProgNote35a<****)*

>training2a< "PRIOR to >month<, when did the most recent training take place?

What year?"

____ 1980-2001
9998 Unknown
9999 Refusal

>training2b< "What month?"

__ 1-12
98 Unknown
99 Refusal

>training3< "How many hours of training did this involve?"

____ 1-130 hours
998 Unknown
999 Refusal

>e_ProgNote35a< *[Programming Note: If (>farmwork< not equal 1 or >age< < 5) go to* ***>bystanding3<****]*

>introduction6< "Next I will ask about LARGE EQUIPMENT that >Title< may have worked with on YOUR farming or ranching operation, during >month_before<.

1 *Continue*

>largemach< "During that month, did >he_she< operate or help to operate ANY large pieces of machinery or equipment, such as any tillage, planting or harvesting equipment, augers, elevators, feed grinders, mixers or wagons?"

1 Yes
3 No *(go to* ***>largemach2<****)*

8 Unknown *(go to **>largemach2<**)*
9 Refusal *(go to **>largemach2<**)*

>tillage_scr< “Did >he_she< operate or help to operate any tillage equipment, such as discs, field cultivators or plows?”

1	Yes	8	Unknown *(go to **>planting_scr<**)*
3	No *(go to **>planting_scr<**)*	9	Refusal *(go to **>planting_scr<**)*

>tillage0< “Did >he_she< operate or help to operate any powered tillers?”

1	Yes	8	Unknown *(go to **>tillage<**)*
3	No *(go to **>tillage<**)*	9	Refusal *(go to **>tillage<**)*

>tillage_PTO< “Did ANY of the powered tillers have a Power-Take-Off?”

1	Yes	8	Unknown *(go to **>tillage<**)*
3	No *(go to **>tillage<**)*	9	Refusal *(go to **>tillage<**)*

>tillage_shield< “Were ALL of the PTOs on the powered tillers shielded?”

1 Yes
3 No
8 Unknown
9 Refusal

>tillage$_i$< “Which of the following other types of tillage equipment did >he_she< operate or help to operate?” *[Enumerator: Read list of possible answers]*

0	None – No other tillage equipment	5	Rotary hoe
1	Disc	6	Row crop cultivator
2	Moldboard plow	7	Cultipacker
3	Field cultivator	8	Other
4	Chisel plow	98	Unknown
		99	Refusal

>e_ProgNote36< *[Programming Note:*
If (>tillage$_1$< = 8 or >tillage$_2$< = 8 or >tillage$_3$< = 8 or >tillage$_4$< = 8 or >tillage$_5$< = 8 or >tillage$_6$< = 8 or >tillage$_7$< = 8 or >tillage$_8$< = 8)
*go to **>tillage_specify<***
Else
*go to **>planting_scr<***
End If]

>tillage_specify< “Specify other.”

____

>planting_scr< “During >month_before<, did >Title< operate or help to operate any planting equipment, such as planters or drills?”

1 Yes

3 No *(go to **>harvesting_scr<**)*
8 Unknown *(go to **>harvesting_scr<**)*
9 Refusal *(go to **>harvesting_scr<**)*

>planting$_i$< "Which of the following types of planting equipment did >he_she< operate or help to operate?" *[Enumerator: Read list of possible answers]*

0 None – No other tillage equipment
1 Planters
2 Drills
3 Other
8 Unknown
9 Refusal

>e_ProgNote37< *[Programming Note:*
If (>planting$_1$< = 3 or >planting$_2$< = 3 or >planting$_3$< = 3)
*go to **>planting_specify<***
Else
*go to **>planting_PTO<***
End If]

>planting_specify< "Specify other."

____

>planting_PTO< "Did ANY of the planting equipment have a Power-Take-Off?"

1 Yes
3 No *(go to **>harvesting_scr<**)*
8 Unknown *(go to **>harvesting_scr<**)*
9 Refusal *(go to**>harvesting_scr<<**)*

>planting_shield< "Were ALL of the PTOs on the planting equipment shielded?"

1 Yes
3 No
8 Unknown
9 Refusal

>harvesting_scr< “During that month, did >he_she< operate or help to operate any harvesting equipment, such as combines or pickers?”

1 Yes
3 No *(go to **>augers_scr<**)*
8 Unknown *(go to **>augers_scr<**)*
9 Refusal *(go to **>augers_scr<**)*

>harvesting< “Did >he_she< operate or help to operate any self-propelled combines?”

1 Yes
3 No *(go to **>harvesting2_scr<**)*
8 Unknown *(go to **>harvesting2_scr<**)*
9 Refusal *(go to **>harvesting2_scr<**)*

>combine_shield< “Were ALL of the moving parts of the combines shielded?”

1 Yes
3 No
8 Unknown
9 Refusal

>harvesting2_scr< “Did >he_she< operate or help to operate any other harvesting equipment connected to a tractor, such as a forage harvester, mower, baler, stacker, pull-type combine, corn picker or specialty harvester?”

1 Yes
3 No *(go to **>augers_scr<**)*
8 Unknown *(go to **>augers_scr<**)*
9 Refusal *(go to **>augers_scr<**)*

>pickers$_i$< “Which of the following types of harvesting equipment did >he_she< operate or help to operate?” *[Enumerator: Read list of possible answers]*

0 None – No other harvesting equipment
1 Disc
2 Moldboard plow
3 Field cultivator
4 Chisel plow
5 Rotary hoe
6 Row crop cultivator
7 Cultipacker
8 Other
98 Unknown
99 Refusal

>e_ProgNote38< *[Programming Note:*
If (>pickers$_1$< = 8 or >pickers$_2$< = 8 or >pickers$_3$< = 8 or >pickers$_4$< = 8 or >pickers$_5$< = 8 or >pickers$_6$< = 8 or >pickers$_7$< = 8 or >pickers$_8$< = 8)
*go to **>pickers_specify<***
Else
*go to **>pickers_PTO<***
End If]

>pickers_specify< “Specify other.”

____

>pickers_PTO< "Did ANY of these types of harvesting equipment have a Power-Take-Off?"

1 Yes
3 No *(go to **>augers_scr<**)*
8 Unknown *(go to **>augers_scr<**)*
9 Refusal *(go to**>augers_scr<<**)*

>pickers_shield< "Were ALL of the PTOs on the harvesting equipment shielded?"

1 Yes
3 No
8 Unknown
9 Refusal

>augers_scr< "During >month_before<, did >Title< operate or help to operate any augers or elevators?"

1 Yes
3 No *(go to **>feedgrinder_scr<**)*
8 Unknown *(go to **>feedgrinder_scr<**)*
9 Refusal *(go to **>feedgrinder_scr<**)*

>augers1< "Which of the following did >he_she< operate or help to operate:

Portable or fixed augers?"

1 Yes
3 No
8 Unknown
9 Refusal

>augers2< "Elevators or conveyors?"

1 Yes
3 No
8 Unknown
9 Refusal

>augers_PTO< "Did ANY of the augers or elevators have a Power-Take-Off?"

1 Yes
3 No *(go to **>feedgrinder_scr<**)*
8 Unknown *(go to **>feedgrinder_scr<**)*
9 Refusal *(go to**>feedgrinder_scr<<**)*

>augers_shield< "Were ALL of the PTOs on the implements shielded?"

1 Yes
3 No
8 Unknown
9 Refusal

>feedgrinder_scr< "During that month, did >he_she< operate or help to operate any feed grinders or mixers?"

1 Yes
3 No *(go to **>wagons_scr<**)*
8 Unknown *(go to **>wagons_scr<**)*
9 Refusal *(go to **>wagons_scr<**)*

>feedgrinder1< "Which of the following did >he_she< operate or help to operate:

Feed grinders?"

1 Yes
3 No
8 Unknown
9 Refusal

>feedgrinder2< “Mixers?”

1 Yes
3 No
8 Unknown
9 Refusal

>feedgrinder_PTO< “Did ANY of the feed grinders or mixers have a Power-Take-Off?”

1 Yes
3 No *(go to* ***>wagons_scr<****)*
8 Unknown *(go to* ***>wagons_scr<****)*
9 Refusal *(go to****>wagons_scr<<****)*

>grinder_shield< “Were ALL of the PTOs on the feed grinders or mixers shielded?”

1 Yes
3 No
8 Unknown
9 Refusal

>wagons_scr< “During>month_before<, did >Title< work on or with any wagons, such as hay racks, forage wagons, gravity boxes or grain carts?”

1 Yes
3 No *(go to* ***>largemach2<****)*
8 Unknown *(go to* ***>largemach2<****)*
9 Refusal *(go to* ***>largemach2<****)*

>wagons$_i$**<** “Which of the following types of wagons did >he_she< work on or with?” *[Enumerator: Read list of possible answers]*

1 Hay rack
2 Forage wagon
3 Gravity box
4 Grain cart
5 Other
8 Unknown
9 Refusal

>e_ProgNote39< *[Programming Note:*
If (>wagons$_1$*< = 5 or >wagons*$_2$*< = 5 or >wagons*$_3$*< = 5 or >wagons*$_4$*< = 5 or >wagons*$_5$*< = 5)*
go to ***>wagons_specify<***
Else
go to ***>wagons_PTO<***
End If]

>wagons_specify< “Specify other.”

____

>wagons_PTO< “Did ANY of the wagons have a Power-Take-Off?”

1 Yes
3 No *(go to* ***>wagons_scr<****)*
8 Unknown *(go to* ***>wagons_scr<****)*
9 Refusal *(go to****>wagons_scr<<****)*

>wagons_shield< “Were all of the PTOs on the wagons shielded? ”

1 Yes
3 No
8 Unknown
9 Refusal

>largemach2< "During >month_before<, did >Title< operate or help to operate ANY equipment for irrigation, chemical or fertilizer application, manure application, or other external or self-powered farm or ranch equipment?"

1 Yes
3 No *(go to* ***>e_ProgNote40<****)*
8 Unknown *(go to* ***>e_ProgNote40<****)*
9 Refusal *(go to* ***>e_ProgNote40<****)*

>irrigation< "Which of the following did >he_she< operate or help to operate:

Irrigation equipment?"

1 Yes
3 No
8 Unknown
9 Refusal

>manure< "Manure application equipment?"

1 Yes
3 No
8 Unknown
9 Refusal

>externalpower< "Other equipment powered by an external source, such as silage or forage blowers, or grain dryers?"

1 Yes
3 No
8 Unknown
9 Refusal

>selfpower< "Other self-powered equipment, such as back-hoes, caterpillars, forklifts, or earth moving equipment?"

1 Yes
3 No
8 Unknown
9 Refusal

>largemach2_PTO< "Did ANY of the these types of equipment have a Power-Take-Off?"

1 Yes
3 No *(go to* ***>e_ProgNote40<****)*
8 Unknown *(go to* ***>e_ProgNote40<****)*
9 Refusal *(go to****>e_ProgNote40<<****)*

>largemach2_shield< "Were ALL of the PTOs on this equipment shielded? "

1 Yes
3 No
8 Unknown
9 Refusal

>e_ProgNote40< *[Programming Note: If (>largemach< not equal 1 and >largemach2< not equal 1) go to* ***>bystanding3<****]*

>riskequip< "PRIOR to >month<, how much risk of injury did you believe there was for >Title< when working with large equipment on YOUR operation? No risk, some risk, moderate risk, or a lot of risk"

1 No risk
2 Some risk
3 Moderate risk
4 A lot of risk
8 Unknown
9 Refusal

>bystanding3< "During >month_before<, how often was/were >he_she< watching activities, playing or standing around, but not working, in fields where machinery was being used? Never, sometimes or frequently?”

1 Never
2 Sometimes
3 Frequently
8 Unknown
9 Refusal

>bystanding4< “During that month, how often >was_were< >he_she< watching activities, playing or standing around, but not working, in fields where machinery was stored? Never, sometimes or frequently?”

1 Never
2 Sometimes
3 Frequently
8 Unknown
9 Refusal

>e_ProgNote41< *[Programming Note: If (>farmwork< not equal 1 or >Age< < 5) go to **>bystanding2<**]*

>introduction7< “Next I will ask about small power equipment and hand tools >Title< may haved worked with on YOUR farming or ranching operation, during >month_before<.”

1 *Continue*

>smallequip< “During that month, did >he_she< operate or handle any grinders, powered shop tools, chain saws, garden tillers or hand tools, to perform activities on YOUR operation?”

1 Yes
3 No *(go to **>bystanding2<**)*
8 Unknown *(go to **>bystanding2<**)*
9 Refusal *(go to **>bystanding2<**)*

>smallequip1< “Which of the following did >he_she< operate or handle:

Portable grinders?”

1 Yes
3 No
8 Unknown
9 Refusal

>smallequip2< “Stationary grinders?”

1 Yes
3 No
8 Unknown
9 Refusal

>smallequip3< “Stationary powered shop tools, such as a table saw or drill press?”

1 Yes
3 No
8 Unknown
9 Refusal

>smallequip4< “Portable powered shop tools, such as a portable saw or drill?”

1 Yes
3 No
8 Unknown
9 Refusal

>smallequip5< "Chain saw?"

1 Yes
3 No
8 Unknown
9 Refusal

>smallequip6< "Other small powered equipment such as a garden tiller, lawn mower or snow blower?"

1 Yes
3 No
8 Unknown
9 Refusal

>smallequip7< "Hand tools, such as hammers, chisels or saws?"

1 Yes
3 No
8 Unknown
9 Refusal

>bystanding2< "During >month_before<, how often >was_were< >he_she< watching activities, playing or standing around, but not working, in a farm or ranch shop? Never, sometimes or frequently?"

1 Never
2 Sometimes
3 Frequently
8 Unknown
9 Refusal

>e_ProgNote42< *[Programming Note: If (>farmwork< not equal 1) go to **>bystanding6<**]*

>introduction8< "Next I will ask questions about work >Title< may have done inside ANY type of storage structure, on YOUR farming or ranching operation, during >month_before<."

1 *Continue*

>storage< "During that month, did >he_she< work inside any storage structure, such as a grain bin, silo, fruit storage bin or manure pit?"

1 Yes
3 No *(go to **>introduction9<**)*
8 Unknown *(go to **>introduction9<**)*
9 Refusal *(go to **>introduction9<**)*

>storage1< "Whcih of the following did >he_she< work inside:

A grain bin or grainary?"

1 Yes
3 No
8 Unknown
9 Refusal

>storage2< "A silo?"

1 Yes 8 Unknown
3 No 9 Refusal

>storage3< "A fruit or other non-grain storage structure?"

1 Yes 8 Unknown
3 No 9 Refusal

>storage4< "A manure pit?"

1 Yes
3 No
8 Unknown
9 Refusal

>introduction9< "Next I will ask questions about work or chores >Title< may have done with chemicals, or activities near water and on ladders, on YOUR farming or ranching operation, during >month_before<."

1 *Continue*

>chemical< "During that month, did >he_she< mix, handle or apply any type of agricultural chemicals, including anhydrous ammonia, pesticides, fuels, lubricants, cleaning agents, veterinary medicines or other chemicals?"

1 Yes 8 Unknown *(go to **>water<**)*
3 No *(go to **>water<**)* 9 Refusal *(go to **>water<**)*

>chemical1< "Did >he_she< handle anhydrous ammonia?"

1 Yes 8 Unknown
3 No 9 Refusal

>chemical2< "Did >he_she< mix, handle or apply pesticides, including: Insectides, herbicides, fungicides and fumigants?"

1 Yes
3 No *(go to **>chemical3<**)*
8 Unknown *(go to **>chemical3<**)*
9 Refusal *(go to **>chemical3<**)*

>pesticides< "Were ALL the pesticides stored in containers labeled with the word DANGER or WARNING?"

1 Yes 8 Unknown
3 No 9 Refusal

>chemical3$_i$< "Which of the following other types of chemicals did >he_she< mix, handle or apply?" *[Enumerator: Read list of possible answers]*

1 Fuels, lubricants or cleaning agents
2 Veterinary Medicines
3 Other chemical products, such as household products, paint, solvents, etc.

4 Other
8 Unknown
9 Refusal

>e_ProgNote43< *[Programming Note:*
If (>chemical3$_1$*< = 4 or >chemical3*$_2$*< = 4 or >chemical3*$_3$*< = 4 or >chemical3*$_4$*< = 4)*
go to ***>chemical_specify<***
Else
go to ***>water<***
End If]

>chemical_specify< "Specify other."

____

>water< "During >month_before<, did >he_she< work in or near a body of water, such as a lake, river, swamp or pond on YOUR operation? This also includes stock tanks and water filled ditches."

1 Yes
3 No *(go to* ***>bystanding6<****)*
8 Unknown *(go to* ***>bystanding6<****)*
9 Refusal *(go to* ***>bystanding6<****)*

>water_yes$_i$**<** "Which of the follwing bodies of water did >he_she< work in or near?"
[Enumerator: Read list of possible answers]

1 Lake
2 River, stream, creek
3 Swamp
4 Pond (incl. Stock pond)
5 Stock tank
6 Water-filled ditch
7 Other
8 Unknown
9 Refusal

>e_ProgNote44< *[Programming Note:*
If (>water_yes$_1$*< = 7 or >water_yes*$_2$*< = 7 or >water_yes*$_3$*< = 7 or >water_yes*$_4$*< = 7 or >water_yes*$_5$*< = 7 or >water_yes*$_6$*< = 7 or >water_yes*$_7$*< = 7)*
go to ***>water_specify<***
Else
go to ***>bystanding6<***
End If]

>water_specify< "Specify other." ___________________________________

>bystanding6< "During >month_before<, how often >was_were< >he_she< watching activities, playing or standing around, but not working, near bodies of water? Never, sometimes or frequently?"

1 Never
2 Sometimes
3 Frequently
8 Unknown
9 Refusal

>e_ProgNote45< *[Programming Note: If (>farmwork< not equal 1) go to* ***>bystanding7<****]*

>ladder< "During that month, did >he_she< work on ANY ladders or scaffolding, on YOUR operation?"

1 Yes
3 No *(go to **>general<**)*
8 Unknown *(go to **>general<**)*
9 Refusal *(go to **>general<**)*

>ladder1< "Which of the following did >he_she< work on:

Ladders or scaffolding greater than 20 feet tall?"

1 Yes
3 No
8 Unknown
9 Refusal

>ladder2< "Ladders or scaffolding 20 feet tall or less?"

1 Yes
3 No
8 Unknown
9 Refusal

>general< "During >month_before<, did >he_she< perform general farming or ranching related activities that we haven't discussed, such as repairing fences or other items?"

1 Yes
3 No *(go to **>bystanding7<**)*
8 Unknown *(go to **>bystanding7<**)*
9 Refusal *(go to **>bystanding7<**)*

>general_yes< "What types of activities did >he_she< do?" *[Enumerator: **Type response exactly as stated + end with ///.** After entering information, press ESC to continue with interview.]*

____

>bystanding7< "During >month_before<, how often ><was_were< >he_she< watching activities, playing or standing around, but not working, out in the fields or barnyard? Never, sometimes or frequently?"

1 Never
2 Sometimes
3 Frequently
8 Unknown
9 Refusal

>riskplay< "PRIOR to >month<, how much risk of injury did you believe there was for >Title<, while watching activities, playing or standing around the farm yard, on YOUR operation? No risk, some risk, moderate risk, or a lot of risk"

1 No risk
2 Some risk
3 Moderate risk
4 A lot of risk
8 Unknown
9 Refusal

>e_ProgNote46< *[Programming Note: If (>Age< < 5) go to **>e_next_caco<**]*

>training4< "PRIOR to >month<, how many hours had >he_she< spent in training or seminars concerned with farm safety and injury prevention?"

0 None *(go to **>e_ProgNote47<**)*
____ 1-130 hours

998 Unknown *(go to **>e_ProgNote47<**)*
999 Refusal *(go to **>e_ProgNote47<**)*

>training5a< "PRIOR to >month<, when did the most recent course or seminar take place?

What year?"

____ 1980-2001
9998 Unknown
9999 Refusal

>training5b< "What month?"

__ 1-12
98 Unknown
99 Refusal

>e_ProgNote47< *[Programming Note:*

If (>Exp_Resp2< not equal 3
*go to **>e_next_caco<**]*
Else if (>farmwork< not equal 1)
*go to **>rprevent1<***
End if]

>rchores_many< "During that >month_before<, would you say that you did as many chores or farmwork as were expected by the family, more chores or less chores than were expected?"

0 N/A – None were expected *(go to **>rprevent1<**)*
1 Did less than expected
2 Did about what was expected
3 Did more than expected
8 Unknown
9 Refusal

>rchores_well< "How well would you say that you performed the chores or farmwork that were expected by the family? Better than expected, about what was expected or worse than expected?"

1 Did worse than expected
2 Did about what was expected
3 Did better than expected
8 Unknown
9 Refusal

>rprevent1< "Do you believe that some farming or ranching operaton related injuries can be prevented?"

1 Yes
3 No *(go to **>rprevent3<**)*
8 Unknown *(go to **>e_next_caco<**)*
9 Refusal *(go to **>e_next_caco<**)*

>rprevent2< "What are the two main things that you think can be done to prevent injuries that occur on the farm or ranch?" *[Enumerator: **Type response exactly as stated + end with** ///. After entering information, press ESC to continue with interview.]*

____

*(go to **>e_next_caco<**)*

>rprevent3< "Why is it that you feel they can't be prevented?" *[Enumerator: **Type response exactly as stated + end with** ///. After entering information, press ESC to continue with interview.]*

____

*(go to **>e_next_caco<**)*

Exit Module

>hh_end1< "Thank you very much for your time today. Goodbye."

1 *go to **>hh_exit<***

>ab_end2< "Thank you very much for your time today. Goodbye."

1 *go to **>ab_exit2<***

>i_end1< "Thank you very much for your time today. Goodbye."

1 *go to **>i_exit<***

>exp_the_end< "Thank you very much for your time today. Your cooperation gives us important information about factors that may prevent injuries, and may be used to develop injury prevention programs that will benefit all farm families. We will be calling your household again in approximately six months. We look forward to speaking with you then. GOOD-BYE."

>final_ProgNote< [Programming Note:
If (>controlHH< = 1 and >caseHH< = 0)
go to **>final_exit3<**
Else If (>controlHH< = 0 and >caseHH< = 1)
go to **>final_exit4<**
Else
go to **>final_exit5<**
End If]

>exp_end2< "Thank you very much for your time today. GOOD-BYE."

1 *Continue to **>exp_exit2<***

>callback< *[Enumerator: Setup callback. Press CONTROL-ENTER to go to the* *appointment block. Remember to record the appointment on the call sheet.]*

>hh_exit< *[Enumerator: Use CONTROL-ENTER and select EXITMODULE. Reason for exiting (1) REFUSED TO PARTICIPATE.]*

>hh_exit1< *[Enumerator: Use CONTROL-ENTER and select EXITMODULE. Reason for exiting (2) NO KIDS UNDER 19 IN HOUSEHOLD.]*

>i_exit< *[Enumerator: Use CONTROL-ENTER and select EXITMODULE. Reason for exiting (1) REFUSED TO PARTICIPATE DURING INJURY LOG.]*

>ab_exit1< *[Enumerator: Use CONTROL-ENTER and select EXITMODULE. Reason for exiting (4) ABBREV INTERVIEW - NO KIDS UNDER 19 IN HOUSEHOLD.]*

>ab_exit2< *[Enumerator: Use CONTROL-ENTER and select EXITMODULE. Reason for exiting (5) COMPLETED ABBREVIATED INTERVIEW.]*

>exp_exit2< *[Enumerator: Use CONTROL-ENTER and select EXITMODULE. Reason for exiting (8) REFUSED IN MIDDLE OF CASE-CONTROL.]*

>final_exit3< *[Enumerator: Use CONTROL-ENTER and select EXITMODULE. Reason for exiting (7)* COMPLETED INTERVIEW - CONTROL.*]*

>final_exit4< *[Enumerator: Use CONTROL-ENTER and select EXITMODULE. Reason for exiting (6)* COMPLETED INTERVIEW - CASE.*]*

>final_exit5< *[Enumerator: Use CONTROL-ENTER and select EXITMODULE. Reason for exiting (3)* COMPLETED - NOT A CASE OR CONTROL.*]*