Risk Taking in Snow Sports:

A Mixed Methods Inquiry into a Link with Helmet Wear

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ABSTRACT

Title: Risk Taking in Snow Sports: A Mixed Methods Inquiry into a Link with Helmet Wear
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Attitudes toward risk taking and helmet wear were explored using mixed methods with 50 skiers and snowboarders aged 15-30. Triangulation from focus groups, the Risk Orientation Questionnaire, the Risk Motivation Questionnaire and the Sensation Seeking Scale-V demonstrated snow sport participants score above risk-taking norms, but do not perceive themselves to be risk takers. Risk attitude scores did not vary with equipment selection, gender, education level, or frequency of experience. Women were more risk adverse, but partook in risk-taking despite hesitations. Head injury histories did not increase helmet wear. A belief in calculated risk-taking enabled skiers to exert perceived risk control up to a taut edge; snowboarders defied risk by riding on the brink of losing control. Snowboarders and those with the least experience were more susceptible to boredom. Peer group norms superseded personal values when considering risk taking. Fashion dictates out weighed safety considerations for helmet choice. Detailed suggestions for intervention programs highlighted the strong ambivalence exhibited concerning risk taking and the adoption of helmets. Barriers and motivators for helmet adoption critically identified that participants with higher risk scores adopted helmets to facilitate learning riskier maneuvers.

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CHAPTER ONE

Snow sports are inherently risky. Part of the allure of these sports is risk-taking and mastering the challenges of pitting self against the elements. Potential injury is aligned with that risk-taking. One such injury is concussion. Since the highly publicized deaths of Sonny Bono and Michael Kennedy, the use of helmets have been advocated for risk reduction in snow sports (American Academy of Pediatrics Commission on Clinical Policies and Research, 1999; Diamond, Gale, & Denkhaus, 2001; A. Levy & R. Smith, 2000; Powell, 2001; Rees-Jones, 1999). These anecdotally-based calls for helmet adoption have finally been supported by research demonstrating a 29% reduction in head injury with the use of snow sport helmets (Hagel, Pless, Goulet, Platt, & Robitaille, 2005). Several movements are underway to increase helmet wear on the slopes. Participant viewpoints regarding the adoption of helmets and gaining insight into perceptions of risk on the slopes are critical to any successful intervention.

Head Injury

The seriousness of concussion has become appreciated during the last decade. No longer are "head dings" given short shrift by coaches or sports medicine professionals. There is growing evidence confirming sustained neurological damage even after minor hits, and recognizing the multiplication of "second hit" or repeated concussion effects (American Academy of Pediatrics Commission on Clinical Policies and Research, 1999; Cantu, 1998; Kushner, 2001; Powell, 2001). Long term

indicators of reduced school and job performance, together with impaired social interactions in cohorts of athletes who sustain head trauma as youths, underscore the importance of rethinking the concept of "minor head trauma" (Collins et al., 1999). Links have been made with early onset of Parkinson's, Alzheimer's and clinical depression with concussions (Junque, 1999; King, Crawford, & Wenden, 1999; Weber & Jaksche, 1999).

The overall pattern of a 50% reduction in skiing injuries over the past 25 years does not hold true for neurological injuries (Hunter, 1999; A. Levy & R. Smith, 2000). Research highlights the increasing prevalence of concussion injury reports (Diamond et al., 2001; Fukuda, Takaba, Saito, & Endo, 2001; Hentschel, Hader, & Boyd, 2001; A. Levy & R. Smith, 2000; Nakaguchi et al., 1999; Ronning, Gerner, & Engebretsen, 2000; Sacco, Sartorelli, & Vane, 1998). There are more than 12,700 snow sport related head injuries annually in the United States. They comprise 14% of all snow-sport injuries overall and 22% of injuries in children. Two thirds of these injuries occur in parts of the head that would be covered by helmets (Consumer Product Safety Commission, 1999; A. Levy & R. Smith, 2000).

Injury risk may be up to four times more likely in snowboarders than in skiers (Dohjima, Sumi, Ohno, Sumi, & Shimizu, 2001; Machold et al., 2000; MacKenzie, 2000; Macnab & Cadman, 1996). Approximately one-third of resort guests are riding boards, and parity is expected to be achieved with skiers by mid decade (Consumer Product Safety Commission, 1999). The overwhelming majority of children are on snowboards. The specific constraints of the snow-riding technology, in combination with juvenile norms of risk taking and rebellion, yield a sport demonstrably higher in

terms of the number and intensity of injuries, especially in beginners (Ferra, McKenna, & Gilman, 1999; Fukuda et al., 2001; B. Hagel, W. Meeuwisse, N. Mohtadi, & G. Fick, 1999; Hentschel et al., 2001; A. Levy & R. Smith, 2000; Machold et al., 2000).

Risk and Snow Sport Injuries

The paradigm of viewing injuries as accidents is no longer applicable. Injuries are no longer viewed as accidental, random events; they are viewed as predictable within a causal chain of evidence. As such, it is believed they can be prevented through changes in equipment, conditions or circumstances, and/or human volition (Sleet & Gielen, 1998). Because no effective treatments reverse the damage of traumatic brain injury, prevention becomes imperative.

Injury-inducing factors have been identified in several snow sport studies. These include, but are not limited to: the decreasing enrollment in ski schools; the link of jumping maneuvers to more than 30% of all injuries; the denial of self-vulnerability; youthful exuberance; and typical adolescent defiance of norms (Diamond et al., 2001; Goulet, Regnier, Grimard, Valois, & Villeneuve, 1999). The difference in injury rates for those who are more expert compared to beginners holds true in snow sports as in other sports. Those with more skill and experience sustain fewer injuries (Bouter, Knipschild, Feij, & Volovics, 1988; Goulet et al., 1999; Kontos, 2004; O'Neill & McGlone, 1999; Pakkari, Kujala, & Kannus, 2001; Smith, Ptacek, & Smoll, 1992). Hence, the brunt of societal and personal impact is borne by the mass of recreational participants, not the skiing elite.

Risk seeking is now found in many avenues of life and becoming more socially acceptable. "Xtreme Sports" adventures are being promoted by some winter resorts as part of a "family" holiday package. Acrobatic ski and snowboard tricks, once only glorified in the media, are now available to the general public by the placement of specialized terrain parks and classes on aerial tricks (Ognintz, 2004). These maneuvers portend more risk of trauma, including neurological trauma.

Risk Taking

Risk taking is linked with injury causation (Pickett, Garner, Boyce, & King, 2002; Turner, McClure, & Priozzo, 2002). In a large study covering youthful injuries (not snow sports specific), Pickett and colleagues found that the youth reporting the largest number of risk behaviors were the most likely to sustain injury at a level four times that of youth who had no risk behaviors. This was especially the case for those sustaining more severe injuries (Pickett et al.). Peer group influences were universally associated with risk-taking, if that was the cultural norm of the group. Group expectations for risk behavior superseded the individual's personal norms of behavior (Pickett et al.). Solid objects and environmental hazards contributed to causality of injury in many cases. Rebellious and anti-social behaviors had the most predictive value for injury events (Pickett et al.).

There are four domains of risk taking: social, financial, physical risk taking that leads to injury, and physical risk taking that leads to future medical conditions (such as smoking or unsafe sex) (Rohrmann, 2002). Willingness to take a risk in one domain does not necessarily transfer to risk taking in other domains. Individuals are deemed risk-willing or risk-averse in their approach to each situation. They are

influenced by cultural roles, peer influences, situational contexts and developmental norms (RiskPsychology.net, 2004; Rohrmann, 2002).

Deciding to take risks or avoid them, an individual must have a perception of the degree of risk involved with the behavior or activity. The individual's perception of how large the risk is and any ensuing consequences plays a large role in determining behavior (Adams, 1999; Churilla & Baker, 2002; Rosenbloom, 2003; Wolpert, 1996; Yates, 1992; Zalenski, 1983; Zuckerman, Eyseneck, & Eyseneck, 1978). Those who are generally risk-averse perceive situations and activities to hold higher risk than those deemed risk takers in each domain. Those who tend to seek risks would consider the same event to be less risky (RiskPsychology.net, 2004). Snow sports fall into the group of sports attractive to those with higher risk taking tendencies (Zuckerman, 1983).

Significance of the Study

Overwhelming epidemiological evidence exists concerning the significance of concussive injury in snow sport participants. It exhibits an alarming upward trend, especially in young people who take up snowboarding. Concussion and head injury are neither a temporary disability nor an inconvenience; they are recognized to have potential life-long impact. Action must be taken where possible to decrease the danger on the slopes. Though not the final answer, helmets may contribute to the solution.

Behavioral studies indicate risk-taking is interwoven into the chain of causation for injury events. It is known that those who are risk seekers tend to enjoy snow sports (Zuckerman, 1983). It is unknown whether recreational snow sport

participants consider themselves risk takers. Also unknown is whether risk tendency influences attitudes toward the adoption of helmets. Helmet safety programs need to address these issues and concerns from the user perspective. Interventions need to consider the influences that generate ambivalence toward a health care change. Programs that do not do so are unlikely to institute significant and sustained change. It is understood that helmets can and do contribute to safety and protection on the slopes. What is questioned is whether helmet wear might encourage additional risk taking. This study intends to start addressing some of these questions.

Statement of Purpose

The aims of this study are to a) examine perceptions of risk and risk taking among snow-sport recreational level participants ages 15-30; b) gain insight as to whether those attitudes are associated with helmet wear; and, c) gather data as to whether adoption of snow sport helmets contributes to a tendency toward higher levels of risk taking on the slopes. Using mixed methods, a full qualitative and quantitative arm will be completed with findings integrated to address these aims. Four key questions will be considered to guide the research toward achieving these aims: a) Do youthful snow sport participants believe they are risk takers; b) what aspects of their sport are perceived to potentially hold risk; c) what motivates them to take risks; and d) how do they respond to suggestions to wear helmets?

CHAPTER TWO: REVIEW OF THE LITERATURE

Review of the literature for this dissertation is limited to sources directly related to the specifics of the study, snow sport head injury and the use of snow sport helmets. Because bicycle helmet research serves as a discussion point for the results, it is included as a summary of barriers and motivators toward helmet wear. The conceptual frameworks of ambivalence and risk-taking follow. Discussion of ambivalence includes attention to the Theory of Diffusion of Innovation. The section on risk-taking includes discussions about sensation seeking; the link between risk and injury causation, and the roles of protective equipment; and, an acknowledgement of the non-mainstream idea of risk compensation. It also contains the literature review of risk taking in snow sports. This chapter concludes with an overview of the characteristics of the "echo boomer" generation from which the sample was drawn, a rationale for use of the conceptual frameworks, and the operational definitions of the terms used in the study.

Snow Sport Head Injury

The National Electronic Injury Surveillance System (NEISS) tracks injuries for all sports, including skiing (NEISS, 2003). The injuries rates are compiled yearly for the 57 million winter resort visitors nationally. This data only reflect injured individuals directly interfacing with slope side clinics or emergency rooms. An equal number may bypass these contacts and opt for unreported self-care (Langran & Selvaraj, 2002).

Although popularly thought that skiing is a significantly dangerous sport, it actually falls far behind many sports in the numbers of injuries and deaths sustained per participant per year (NEISS, 2003; Xiang, Kelleher, Shields, Brown, & Smith, 2005). Bicycling has 7.1 deaths per million participants compared to snow sport rates of 2.5-

2.9 per million (Levy, Hawkes, Hemminger, & Knight, 2002). Even among those regularly participating in snow sports, 80% perceive the injury rate to be much higher than the actual numbers demonstrate (Langran, 2003).

It is estimated 100,000 persons are injured each year at snow sport resorts, or 3 of every 1000 guests (Langran, 2004). Of that number, 12,700 sustain head injuries, comprising 14% of all injuries and 22% of all injuries in children. Two-thirds occur in parts of the head covered by helmets (A. S. Levy & R. H. Smith, 2000; USCPSC, 1999). Though overall ski injuries have decreased since 1970, the incidence of head injury is increasing (Hagel, Pless, & Platt, 2003; USCPSC, 1999; Xiang et al., 2005).

Snow sports participants are overwhelmingly male (66%), 95% white and below the age of 40 (Levy et al., 2002). The number of snowboarders have increased dramatically in the past decade with a typical ratio of 67% skiers and 27% snowboarders (Langran & Selvaraj, 2002). A majority of the newest participants are youthful boarders. Children and youth are over represented within injury statistics (Goulet et al., 1999; Langran & Selvaraj).

Injury Severity

Ninety-four percent of head injury patients are treat-and-release cases. Of those requiring more definitive observation or intervention, 24% involve skull fractures, 39% intracranial lesions and 79% demonstrate persistent amnesia (Diamond et al., 2001). The more significant injuries occur in males (Hagel, Goulet, Platt, & Pless, 2004; Levy et al., 2002). The distribution of injuries by age is bimodal with peaks at age 55-64 and 10-13 for skiers (Xiang et al., 2005). Skiers older than 55 have worse outcomes when functional independence measures and duration of rehabilitation are considered (Levy

et al.). When evaluated by equipment style, snowboarding head injury rates for ages 10-24 are almost double the rates of other age groups also riding snowboards.

There are 24-49 skiing related fatalities per year nationally. Though many victims have multiple injuries, the Consumer Products Safety Commission (USCPSC) reports head injuries are the leading cause of demise in 59-88% of these fatalities (1999). In children, 67% of deaths are caused by traumatic brain injury (Xiang, Stallones, & Smith, 2004). Of the 15 deaths in Colorado during the 2001-2002 season, 14 were un-helmeted individuals. Doctors asserted 12 of the 15 would have survived with helmet protection (Janofsky, 2002). The USCPSC claims 11 deaths per year would be averted with helmets (1999). This contrasts with Shealy's findings that helmets would not have been of any value in the 54 deaths in Vermont from 1979-1998 (Morrow, 2003).

Research in the early 1990's found parity in the number of head injuries between skiers and riders when snowboarding was still a young sport with limited participants (O'Neill & McGlone, 1999; Prall, Winston, & Brennon, 1995; Sacco et al., 1998; J. E. Shealy, 1993). This parity has changed with more recent reports indicating up to four times the risk of head injury in boarders compared to skiers (Bladin & McCrory, 1995; Davidson & Laloitis, 1996; Dohjima et al., 2001; Levy et al., 2002; Machold et al., 2000; MacKenzie, 2000; Macnab & Cadman, 1996; Made & Elmqvist, 2004; Ronning et al., 2000). Shealy, one of the leading longitudinal researchers in the field, amended his 1993 parity findings with newer trends demonstrating evidence of higher risk in boarders in 1997. Hagel reported a 50% increase in rates of head, neck

and trunk injuries from 1995 to 2000 for snowboarders as the sport gained in popularity among youth (2004).

Factors Leading to Injury

Eighty-five percent of snow sport injuries stem from self-induced falls. Collisions with another person involve 8%. Collisions with trees and objects such as poles and buildings account for 5% of injuries. Ski-lift related accidents constitute 2% of all injuries (Bergstrom, Askild, Jrgensen, & Ekeland, 1999). Hitting inanimate objects causes more severe trauma. When considering head injuries that require evacuation to a Level I Trauma unit, collisions with stationary objects is 47.4%, simple fall 36%, skier-to-skier contact 13.1% and major falls 10% of the patients treated (Levy et al., 2002).

Person-to-person collisions are a growing threat on crowded ski slopes (Xiang et al., 2004). Levy found 24% of female head injured patients had a skier-to-skier collision compared to 10% of the male patients. More than half of the males with head injuries involved skiers hitting trees compared to 40% of the females doing the same (Levy et al., 2002). Hagel found the collision rate increasing only in snowboarders, not skiers (2004).

The difference in injury rates between those who are more expert and beginners holds true in most sports. Those with more skill and experience sustain less injuries (Bouter et al., 1988; Goulet et al., 1999; Kontos, 2004; O'Neill & McGlone, 1999; Pakkari et al., 2001; Smith et al., 1992). Those who have previously sustained an injury are more likely to do so again (Chalmers, 2002; Van Mechelen et al., 1996).

Although children comprise 12% of all snow sport participants, they represent 23% of snow-sport injuries (Diebert, Aronsson, Johnson, Ettlinger, & Shealy, 1998; Goulet et al., 1999; Hackam, Kreller, & Pearl, 1999; B. E. Hagel, W. Meeuwisse, N. Mohtadi, & G. Fick, 1999; Macnab & Cadman, 1996; Shorter, Mooney, & Harmon, 1999). Those not enrolled in lesson programs appear more likely to sustain an injury, but this is not borne out statistically (Diamond et al., 2001; Langran, 2003; Langran & Selvaraj, 2002). Snowboarders typically skip formal programs and learn to ski on their own or with friends, leading to participants with less awareness of basic safety principles and knowledge of safety equipment (Langran).

Alcohol consumption within 12 hours of skiing is linked with increased injury risk (Cherpitel, Meyers, & Perrine, 1998). However, a Trauma I Neurological Center in Colorado reported only 3.1% of skiers and snowboarders had documented alcohol use compared to a 31.4% use rate for head injuries from motor vehicle crashes listed in the same trauma registry (Levy et al., 2002).

Other contributing causes for injury identified in the literature include: use of borrowed or rented equipment; jumping maneuvers; denial of self-vulnerability; youthful exuberance; and typical adolescent defiance of norms (Diamond et al., 2001; Diebert et al., 1998; Dohjima et al., 2001; Fukuda et al., 2001; Goulet et al., 1999; Langran & Selvaraj, 2002; Made & Elmqvist, 2004). Injury rates are also associated with poor weather, fatigue and skiing during the afternoon to evening hours. Some studies conclude weekends are more predictive of injury (Cherpitel et al., 1998; Levy et al., 2002). Surprisingly, the USCPSC (1999) reports most accidents occur on sunny days and within four hours of arrival. This can be attributed to the typical early morning

travel period prior to arrival at the resort plus very high energy expenditures, resulting in fatigue as an issue even during that first four-hour period.

Technological Influences

Engineering advances in snow sport equipment, as well as slope preparation, have facilitated the rapid progression of relative beginners from easier ski runs onto more advanced terrain (Fatsis & Costello, 1999; Johnson, Ettlinger, Shealy, & Meador, 1997). In prior years, ski skills were fine-tuned incrementally over several seasons, thus allowing for development of the experience that influences slope-side decision making. The advent of shaped skis and snowboards has compressed the time traditionally spent on beginner trails before advancing to intermediate slopes, because this equipment instills a higher level of confidence in novices (Johnson et al.). As a result, less experienced participants are on intermediate level slopes earlier than before.

Modern slope grooming techniques are credited with reducing the pre-1970 injury rates; however, these techniques also induce higher speeds. The wider expanses and "corduroy track" of the groomer machines invite a sense of confidence and stronger illusions of control (Fatsis & Costello, 1999; Johnson et al., 1997). As a result, an average intermediate skier on a moderate slope can reach speeds of 25-35 mph (Langran, 2004; J. Shealy, Ettlinger, & Johnson, 2005; USCPSC, 1999). Speed magnifies the intensity of injury (Hunter, 1999). High-speed, larger capacity lifts also enable skiers to take more daily runs on these higher slopes. These extra trips engender injury-inducing fatigue. Not surprisingly, most head injuries occur on these intermediate slopes (USCPSC, 1999).

The proliferation of snow terrain parks (play areas with half-pipes, rails and slope contouring to facilitate aerial moves) may also contribute to the increasing trend of snowboarding injuries (Hagel et al., 2004). There is a higher density of boarders in these terrain areas which encourage jumping. The review of literature did not uncover any studies about the implications of providing such challenging parks to do "tricks and stunts" while in the presence of admiring peers and in a resort zone not frequented by the older, supervising skiers of their family group.

Snow Sport Helmets

The primary literature on snow helmets is the opinion or editorial piece in both the popular press as well as professional journals. Mandatory wear and legislative efforts to encode helmet wear are highly contentious issues. Wear had been recommend for beginners and children based on assumptions of the protective effects of the helmet until direct evidence emerged in the new century. Most snow sport research still concentrates on the enumeration of sport injuries with epidemiological analysis of persons, situations and contexts of injury, not issues of personal behavior.

Anti-helmet Sentiment

Anti-helmet sentiments are reminiscent of the perennial motorcycle helmet debate. Table 1 lists the more commonly repeated objections complied from several articles (Brooke, 1999; Cohen & Trinker, 1999; Hennessey, Morgan, Elliot, Offner, & Ferrari, 2002; Janofsky, 2002; Langran, 2003; Laskowski, 1999). It mirrors the barriers extracted from a bicycle helmet research synthesis (Robinson, 2003a).

Table 1:

Compiled Objections to Helmets

Commonly Repeated Objections to Wearing Ski Helmets	
They make me too hot.	My head gets too cold.
They are too expensive.	It impairs my hearing.
It changes my center of balance.	It restricts my freedom.
They are only for kids.	You've gotta die someday.
Won't protect you	Didn't know about them
It makes me look like a "dork."	I'd rather wear my favorite hat.
I've never worn one before.	I never fall.
No need	Causes more problems
It's one more thing to carry.	It causes more injuries than they help.

The American Medical Association (AMA) found a difference in the public support for the use of helmets in skiing compared to bicycling (1997). There are three hypotheses why there is less support for ski helmet wear:

> Head injuries constitute a far greater percent of bicycle accident injuries (as much as 32%) than of skiing injuries (under 5%); (2) head injuries from bicycle accidents are more often associated with death (over 60%) than are head injuries from skiing accidents (1%), and (3) standards for bicycle helmets are established and appear effective in reducing serious head injury, which is in contrast to ski helmets for which there are no....data on effectiveness (1997, pg. 6).

Ettlinger and Shealy (1999) share a research-based opinion about the possible negative aspects of helmet use. Though cautiously endorsing helmets, they are wary of possible behavioral changes in those wearing helmets, such as dangerous feelings of invulnerability. They cite 1999 statistics showing 35% of fatally injured skiers wore helmets and that another 35% of helmeted skiers sustained head injuries. Given that only 15% of the resort population were found to wear helmets, these statistics

suggested helmeted snow sporters sustained an undue proportion of the number of injuries (Ettlinger & Shealy). As such, they believe wearing helmets might engender risky behavior in some skiers and snowboarders.

The media also address the topic of potential harm from helmet use (Jurgensen, 2003; Lichtenstein & Isham, 2003). One concern is a potential increase in spinal injuries due to the weight of the helmet atop a flexible cervical spine. It is also feared that helmets might impair peripheral vision and muffle sound, contributing to a greater number of collisions (A. S. Levy & R. H. Smith, 2000). Recent research has dispelled some these issues (Hagel et al., 2005; Macnab, Smith, Gagnon, & Macnab, 2002).

Governmental Reports and Policies

Upon review of numerous studies concerning fatalities and neurological injuries, the USCPSC issued a call for adoption of snow sport helmets (1999). This synthesis of literature report suggests helmet wear can prevent up to 44% of head trauma, with an anticipated 53% reduction in injuries for children under 15. The USCPSC claims 11 fewer skiing fatalities annually may occur with helmets, a change downward from the recorded average of 24 deaths per year.

Some state legislative bodies have debated mandatory helmet regulations, but no laws currently exist in the United States. The major thrust for required use has been for children under age 12 enrolled in formal ski schools at select ski resorts. Such policies usually stem from insurance and legal liability concerns (Frangos, 2002).

Prevalence of Wear

Adoption of helmets is rising in other concussion risk sports such as in-line skating, biking and skateboarding. The percentages of youths and adults wearing

helmets while engaged in snow sports lag in comparison (Cohen & Trinker, 1999). However, that number is climbing (Anderson et al., 2004).

A recent study reports 25 to 28% of the population from 19 different Quebec ski resorts wore helmets in 2001-2002 (Hagel et al., 2005). Anderson and colleagues also note an increasing prevalence of helmet wear among experts, snowboarders, those with higher education, and in more frequent resort visitors (2004; Buller et al., 2003). Weather does not influence wear. The overall wear percentage is reported as 12.1% (N = 2978) in 28 different ski resorts. Similar wear rates of 12.9% are reported from Scotland (Langran, 2003). However, of those wearing helmets in that study, only 42.4% (N = 33) indicated they were happy to do so.

Gender, age and equipment preference are factors in helmet use (Buller et al., 2003). Women regardless of age are less apt to wear them. Macnab (N = 253) found a 54% wear rate in skiers under age 13 compared to 28% for the same age in boarders (2002). In Buller's study limited to adults (N = 3525), fewer skiers than snowboarders wore helmets at all ages, but as age increased so did use in both groups. Interestingly, the highest wear rate was found in boarders over 46 years (36.6%) and in skiers over 55 years (16.8%). This generation did not grow up wearing helmets to ski or bicycle. This contradicts the commonly held belief that more youthful boarders are wearing helmets, because they have been accustomed to their use in other sports since early childhood (Buller et al.). This discrepancy may be related to older participants being more aware of their vulnerability.

The availability of helmets for rental use varies geographically with a majority in the Northeast (57%), Western (63%), and Rocky Mountain (71%) ski areas. The

Southern region (37%) and Midwest (23%) lag behind (Clingenpeel & Marshall, 2003). While 38% of all skiers at Colorado resorts rent equipment, the largest percentage of those also renting helmets is 8% (Hennessey et al., 2002). Most rental ski equipment packages do not include helmets (Clingenpeel & Marshall).

Helmet Effectiveness

Snow sport helmets are engineered under voluntary industry standards for impacts up to 10-14 mph (AMA, 1997; Ettlinger & Shealy, 1999; J. Shealy et al., 2005). Although the engineering rating is low relative to actual speed, an element of protection is retained for the slow velocity falls of beginners and the glancing blows of collisions with others (AMA; J. Shealy, Johnson, & Ettlinger, 1997). Beliefs that these helmets are ineffective at the typically higher speeds on intermediate slopes are tempered by a lesson drawn from the motorcycle helmet literature. Motor cycle helmets are shown to be 67% effective against injury and 35% protective against fatal injury at speeds significantly higher than those in skiing, although only engineered to be protective at 13.4 mph (A. S. Levy & R. H. Smith, 2000; USCPSC, 1999).

Helmets can make a difference in severity of injury. This is especially true for snowboarders, who typically sustain more backward falls as compared to the usual forward falls of skiers (Hunter, 1999). The difference in mechanism of falls between snowboarders and skiers may portend the need for different types or/styles of helmets for each snow sport (A. S. Levy & R. H. Smith, 2000; Macnab et al., 2002). Experts agree that only helmets intended for use in snow sports should be worn on the slopes.

Two recent studies lend credence to the earlier conjecture that helmets would make a difference for concussive injuries. In a study focusing on children under age 13

(N = 70 injured), Macnab and associates (2002) found helmets to be 43% effective in reducing facial, neck and head trauma . They also found helmet wear did not contribute to spinal injury rates. They noted collisions as a mechanism of injury did not differ with helmet wear, thereby discounting objections about auditory and visual impairment with helmets.

The above study's size and lack of control over several variables prompted Hagel's most recent work (2005). This matched case-control and crossover study involved 1082 cases with head and neck injuries and 3295 controls with other injuries. Matching was achieved for date of injury, age, sex, and equipment selection. A 29% reduction was noted in the risk of head injury associated with helmet wear. This infers that for every ten helmet users, three to six may avoid head injury. The impact might have been more conclusive had those who fell and hit their heads while wearing helmets, but did not sustain an injury, been included in the statistics.

Hagel's study (2005) also found helmet wear rate patterns for those experiencing head injuries (25.3%) to be the same as the controls (28.2%) . Injury patterns were similar between these groups. Prevalence of wear rates decreased with age and age did not appear to matter in type or severity of head injury (Hagel et al.). Disturbingly, the wear rate for those with neck injuries (39.1%) was higher; however, Hagel's spinal data was based on only eight cases, thus rendering unanswered the issue of potential spinal injury.

Bicycle Helmet Overview

Research about the attitudes and arguments against helmet wear in skiing and snowboarding is still in the development stage. Arguments against helmet adoption in

other sports may parallel objections in snow-sports. It is understood that the barriers identified in one sport cannot directly translate into understanding helmet use in another sport, especially one that occurs in significantly different weather and site contexts. Given that understanding, barriers to helmet use found in other sports can be used to formulate questions for focus groups and a starting point for research in snow-sports. Bicycle helmet use more closely parallels snow sport wear than intentional impact sports, such as football and hockey, or mechanized sports, such as motor cross and racing. Therefore, the findings of a limited research synthesis on the barriers and motivators for bicycle helmets form the basis of the section below.

Bicycle Helmet Wear Barriers

Barriers are defined as attitudes, attributes or conditions that contribute to a decision not to wear a helmet when cycling (Robinson, 2003a). Study samples in this synthesis of literature (N = 14 studies) were primarily children, predominantly pre-teen and early teen groups. This age range is recognized as the prime period when parentally suggested helmet wear dramatically drops off and peer influenced attitudes prevail.

The more common issues associated with barriers to helmet wear and the number of studies in parenthesis are: parental influence (9), peer influence (6), comfort issues (5), maturation of the child (5), fashion objections (4) and a belief that wear is not needed in all situations (8). Less common barriers identified are: male gender (3), forgetfulness (2), a perception laws mandating use would not be enforced (2), riding alone (2), and liaise-faire parental oversight based on belief of higher wear patterns in children than reality indicated (2). Personal freedom issues and the link between prior injury and adoption of helmet wear are each cited once (Robinson, 2003a).

Though similarities exist across all age groups, some barriers held higher influence at different developmental stages. Fashion and peer pressure create stronger impacts in pre-teens and teens. Teens focus heavily on the ill-defined issues of "annoyance" and "comfort." The child group has a unique barrier of "I outgrew it;" early purchases need to be replaced as the skull grows. Adults generally did not role model helmet wear for their children.

Barriers Not Found

Opinion pieces and earlier research studies highlight cost as potentially inhibiting helmet wear. Helmets meeting safety standards for impact and durability can cost $50-$100 or more. Interestingly, helmet use does not significantly increase in a sustained manner, when helmets are provided free and/or at low-cost (Britt, Silver, & Rivara, 1998; Hendrickson & Becker, 1998; Parkin & Hu, 1995a). The status of helmet ownership or possession does not translate into higher wear patterns.

Other Key Findings

Higher educational or income levels consistently translate into higher wear patterns for all age groups. Inner urban, low income and rural populations (which are demographically more likely to have lower social economic status in these studies) demonstrate significantly lower wear rate patterns. These trends persist even after educational intervention programs and free or subsidized helmet programs occur. Reasons or opinions for these trends were absent in the reviewed studies (Robinson, 2003a).

A national survey determined overall helmet use rates are highest on the Pacific Coast and decrease as sample respondent's geographic location is in Midwestern,

Southern, or Northern regions (Rodgers, 1996). The highest representative samples for prolonged helmet use were in the Pacific Northwest, where the data for this dissertation was collected.

Synthesis of Findings

Three trends in the bicycle helmet literature attract attention: parental role modeling, peer influence and perception of safety issues. Typically parents are un-helmeted. Consistently, if parents use helmets, the odds of the accompanying children wearing helmets are significantly higher. Children indicate they would wear helmets more often if their parents either insist upon it or also use one while cycling. Helmets disappear from the heads of children when un-helmeted accompanying parents depart the cycling group. Parents consistently over-estimate the helmet use frequency for their children. Children's reports of parental wear are accurate (Robinson, 2003a).

The second trend is the influence of peers. At the pre-teen level, the opinion and cultural influence of peers supersede parental influence on the use of helmets. If peers consider them unfashionable or uncomfortable, the child discards the helmet. Correspondingly, if the peer group is "pro-helmet" or does not object to helmet use, wear patterns while the group cycles together is higher than in groups not so inclined. This finding can be used as an influence variable in an intervention (Robinson, 2003a).

Thirdly, as in other health promotion studies, understanding a safety issue does not necessarily translate into adoption of the safety equipment. While perception of risk is a factor encouraging helmet wear, use remains situational. Biking close to home, on quieter streets or on privately-owned land are cited as situations not requiring use of helmets. Participants perceived injuries to be more likely to occur in urban settings, on

busy thoroughfares or on more extended trips (Robinson, 2003a). The Cochrane reports on injury rates dispel this popular notion and demonstrate more injury in suburban and rural areas (N. J. Thompson, Sleet, & Sacks, 2002).

CONCEPTUAL FRAMEWORKS

This snow sport study draws on two theoretical foundations, ambivalence and risk-taking. For clarity, the review of ski research is deferred until after the risk taking framework is discussed.

Ambivalence

Many individuals have a combined approach to health. They want to avoid bad things, but also want the freedom of self-expression and personal preference. Pender refers to this as an "approach and avoidance" rule that most individuals have toward health care (Pender, Murdaugh, & Parsons, 2002). It is critical to ascertain the motivating factors someone has toward a possible health behavior change (such as helmet use), capitalize on that knowledge, and use it in an approach that will overcome objections, obstacles and resistive forces potentially impeding that change (W. R. Miller & Rollnick, 2002).

Influence of Rational Thought

Western culture is heavily steeped in a rational-mind approach of dealing with change and overall decision-making. It is assumed that people can be convinced to undertake change in their lives by appealing to their inner logic and reasoning abilities. This assumption is faulty because health education programs based solely on knowledge and information sharing are notoriously prone to less than stellar outcomes (Glanz, Lewis, & Rimer, 1997; Pender et al., 2002; Whitehead & Russell, 2004). These

critically flawed approaches fail to incorporate other behavioral influences of change (Ajzen; Glanz et al., 1997; Pender et al.; Proschaska, DiClemente, & Norcross, 1994). Decision-making about health is anything but "rational" in its processes. Making a behavioral change is neither linear, nor logical; it is infused with ambivalence.

Ambivalence and Resistance to Change

Ambivalence is a normal human state in modern society with its swirl of influences. It is defined as the simultaneous and contradictory response of attitudes and feelings toward persons, actions and objects (W. R. Miller & Rollnick, 2002). Ambivalence has its core in uncertainty. It is a state of constant flux. No individual is ever at the perfect point of making a change in their lives; elements of foot dragging or cautionary progress occur in every situation. Uncovering every motivational influence is impossible; finding a sole determining factor is also improbable (W. R. Miller & Rollnick). Change does not hinge on solitary variables that can be easily dissected away from other influences on the decision.

It is an American cultural tendency to seek a single motivating tenet as the rationale for a behavior. Levine's response to Merton's landmark work on sociological ambivalence explored the unique characteristic of this culture to "search for dominant patterns, univalent metrics, monochromatic path diagrams, and unilineal logical derivations" (as cited in Smelser, 1998). In reality, there is no either/or choice in making health care decisions; it is a complex dance of competing preferences and emotions that do not fit into a rational-choice model.

Ajzen sees ambivalence as having three dimensions: cognitive, emotional and intentional (1988). The cognitive dimension includes a person's evaluation of the

subject, which incorporates any prior experience with similar circumstances or events. It is akin to listing the pros and cons of how it is perceived. Lack of knowledge may foster a reluctance to change. This reluctance is not entrenched; it is more easily overcome than actual resistance (Ajzen; W. R. Miller & Rollnick, 2002). The emotional dimension refers to the feelings and moods generated by change. These emotions can be frustration, anxiety or uncertainty concerning what is expected. The intentional dimension may or may not be intertwined with the other two dimensions. The intent may be to change, but it may also be to defy it or to actively seek methods to undermine the process.

Resistance

People yearn for a sense of normalcy, which might be a new stability on the other side of change or a retained stability of the status quo. This search for stability can be interpreted as resistance. Individuals are drawn to the potential positives of the change, but must also deal with the issues associated with leaving something behind (W. R. Miller & Rollnick, 2002). Giving up routine for the unknown engenders uncertainty; hence, reluctance in starting or completing change is common. This is especially true where there is an element true of suffering along the way i.e., drug withdrawal symptoms (Simoneau & Shaffer, 2004). If there are no guarantees that the change will actually result in better health (or some other goal), individuals may question the benefit of starting at all. Instead of seeing short-term discomfort as a necessary and essential investment toward long-term gains, many individuals may prefer their short-term hedonism (W. R. Miller & Rollnick; Simoneau & Shaffer).

Denial

Denial also plays a role. People do not personalize the messages heard in the media. There is an element of "it can't happen to me" involved with everyone in the pre-contemplation stage of change (Proschaska, Redding, & Evers, 1997). Though the injury and accident literature is replete with references to this characteristic in youth, this filtering of messages crosses the lifespan. People do not seriously consider changing their own behaviors until personally confronted with the issue (W. R. Miller & Rollnick, 2002).

There is a natural social construct to put a positive outlook on issues called "optimistic bias" (Lonero, 1998). People are wont to see the bright side and defer to the far future the making of many hard decisions. Freudians call this "repressing the shadow side." Something must alter that complacency for change to occur.

Reactance

Resistance in its more extreme form is called reactance (Brehm & Brehm, 1981; Seibel & Dowd, 1999). It is a strong resistive response to suggestions or edicts made by an outsider that threatens perceived freedoms. Any implied "required" behavioral changes are interpreted as interference with self-expression and freedom of choice (Brehm & Brehm; Seibel & Dowd). In health behavior situations, the restriction of previously enjoyed behaviors, or the implication that current acts are immoral or "stupid" may trigger this response. Freedom of choice is a major "flash point" in the debate about snow sport helmet wear with reactance to lost freedom impeding helmet adoption for some individuals.

Crossley has spearheaded investigations into reactance among groups expressly "transgressive" in their behaviors (2003). This contrarian response to health messages is rooted in a reaction to the "moral good" or personal accountability underlying most health promotion campaigns. Individuals who respond this way refute any influence of "middle class values" or safety, and opt for freedom and desire. This form of reactance is most commonly found in marginalized youth and counter-culture groups (Crossley). Though the snowboarder mystique revolves around disdain for authority and bucking the norms, most recreational boarders are not "hard core" transgressors.

Developmental Considerations

Ambivalence is the hallmark of adolescence. As individuals mature physically and socially, they wrestle with many issues, including the development of internal control (Jessor, 1991). It is considered normative behavior to have a surge in risk-taking behaviors at puberty (Laviola, Macri, Morley-Fletcher, & Adriani, 2003). Once associated with reproductive hormones, these behaviors are not directly influenced by that concurrent change (Susman et al., 1987). It is now believed that structural changes in the developing brain accounts for what is seen (Laviola et al., 2003).

The reward-stimulus system of the body is centered on the dopamine-serotonin system. Exposure to novel situations activates the dopamine system (Bevins, 2001). There is merit in the claims of sports participants that they "get high" on the experiences and are more positive in life outlook due to mood changes related to the increase levels of neurotransmitters (Bevins).

Adolescents in all mammalian species experience imbalance between the growth and development rates of their judgment and decision making centers and

their dopaminergic centers (Laviola et al., 2003; Spear, 2000). There is a temporary decline in the connections between the two systems. Bio-psychologists surmise that adolescent low levels of dopamine result in risk-taking activities to increase those levels (Bevins, 2001; Laviola et al., 2003). The concurrent relative decrease of the inhibitory hormone GABA in the frontal cortex of teens is critical to this change. The regulatory and suppressive effects of GABA are lost, resulting in more impulsivity, and risky behavior ensues.

Physical maturation of the human neurological system is not complete until age 25. This timeline is "out of sync" with the culturally set age of socio-political maturity at 18. Therefore, there is a physiologic basis for exploring "adolescent" behaviors in those culturally considered "young adults." Arnett calls this developmental step between adolescence and maturity "emerging adulthood" to cover this period between 18-25 (Arnett, 2000). "Emerging adults can pursue novel and intense experiences more freely than adolescents because they are less likely to be monitored by parents and can pursue them more freely than adults because they are less constrained by roles" (Arnett, pg. 475).

Diffusion of Innovation

The opposite of resistance and reaction is movement toward adoption of a change. Everett Rogers provides theoretical guidance to the study of change in various fields with his work on the Diffusion of Innovation. He notes five personal responses to adopting a new idea or change in personal or corporate practice. These responses reflect how soon an individual or group adopts a new idea or innovation. They are categorized

according to rapidity of adoption: innovators, early adoptors, early majority, late majority and laggards (Rogers, 1995).

Innovators are the very earliest adopters of new ideas. They quickly embrace new ideas and enjoy the thrill of being on the cutting edge. They typically reflect 2.5% of the population (Rogers, 1995). Early Adopters (13.5% of the population) are receptive and willing to engage in new activities in order to give it a fair trial. Once they accept the change, they tend to be vocal advocates if it proves to be a good decision for them (Rogers). They tend to be more educated (Buller et al., 2003). Early Majority refers to the group who move through change faster than most, but have left the pioneering of such change to the two previous groups (Rogers). They compromise 34% of the number of eventual adopters. These three segments form 50% of the total population. Late Majority refers to the bulk of the remaining population who initially resists the change, but then accepts it, especially because many others are doing so. They constitute 34% of the population. Laggards are the last group to adopt change, and possess the potential for open hostility and possible refusal to accept the change at all. They account for the remaining 16% of the population (Rogers).

Conceptual Framework: Risk Taking

In her analysis of the concept, Jacobs clearly shows that risk has no precise, stable definition (Jacobs, 2000). The concept is used differently by scientists with a theoretical approach versus those intent on measuring its impact on behavior. Across time, the meaning has changed from a sense of neutral statistical probabilities to a more negatively oriented association of dangerous or bad outcomes linked with measurable antecedent and predictive factors. Jacobs goes on to say that the lay

public has its own interpretation on what constitutes risk (2000). This public perception of risk frequently bears no credible relationship to the true scientific evidence of the odds of occurrence, but is heavily influenced by emotion, culture and events.

Characteristics of Risk

The attribute most commonly used in risk research is whether subjects are high-risk or low-risk (Kraemer, Kazdin, & Offord, 1997). High-risk individuals or groups are those more likely to exhibit specific characteristics compared to the population as a whole. Similarly, low-risk individuals are less likely to exhibit the same characteristic. There are no absolute categorizations or absolute certainties concerning the expression of the characteristic. This means that those at high-risk are more likely to demonstrate the characteristic in question over time; it does not guarantee that they will do so, even longitudinally. Probabilities are not absolutes.

Risk factors are neither univariate nor independent, of other factors (Kraemer et al., 1997). The simplistic "if A, then B" phenomena does not exist in human behavior research. Factors can be additive or synergistic. The presence of one can increase the potency of another. They can also have a protective effect against the odds of occurrence of the outcome, reducing the potency, or even the sufficiency, of other risk factors (Kraemer et al., 1999; Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001).

Risk factors are not predictive of outcomes. Rarely can a cause and effect linkage be immutably demonstrated. Only probabilities can be inferred from the causality. The prevalence of the outcome can be discussed in terms of degree of possible or potential impact on occurrence within a specified group or population.

Importantly, the measurement of that outcome is set in space and time with no guarantee against shifting of reported values over time, in other settings, or after changes in socio-cultural influences (Kraemer et al., 2001).

Two predominant themes emerge from the literature on risk taking. The first involves behaviors considered socially unacceptable (i.e., unsafe sex, shared needles in drug circles, speeding, failure to use seatbelts, drunk driving, etc.). The second is the volitional participation in activities that may be socially endorsed, but are recognized as potentially dangerous (i.e., mountain climbing, hazmat cleanup, or military service) (Dennis, 1994; Turner et al., 2002; Tursz, 2000). Snow sports are illustrative of the latter.

Risk Propensity

The willingness to take risks is referenced in the literature as risk-propensity. Individuals are deemed either risk willing or risk averse in their approach to a situation (RiskPsychology.net, 2004; Rohrmann, 2002). Taking risks is not a behavioral trait; rather, it is a state influenced by cultural roles, peer influences, situational contexts and developmental norms. An individual can exhibit an overall tendency to take more risks than the average person, but may not do so in every situation nor consistently over time. For example, someone who takes risks as a youth typically changes the degree of risks assumed after becoming a parent (RiskPsychology.net).

There are four domains of risk taking: social, financial, physical risk taking that leads to injury, and physical risk taking, such as smoking or unsafe sex, that leads to future medical conditions (Rohrmann, 2002). The willingness to take a risk in one domain does not mean that one is likely to take a risk in another. Gonzalez and Field

found that high risk takers in the realm of sports did not necessarily engage in high risk taking in other domains (1994).

Demographics of Risk Taking

Several demographic variables are linked with the probabilities of risk behavior and risk propensity expression (RiskPsychology.net, 2004). Males are more likely to take risks in more situations when compared with females. Age moderates this tendency, with older people having a lower risk propensity than youth. This impact of age is more acute for males; females have a more sustained curve for risk taking behavior over a longer time period (RiskPsychology.net). Gender differences are usually attributed to the differing socialization patterns of children. However, studies done close to the millennium counter that traditional trend with gender becoming less of a divergent demographic (Sweeting & West, 2003; Zuckerman & Kuhlman, 2000).

The true impact of socio-cultural influences on risk-taking is unknown. Cultures promote or hold taboo varying risk taking behaviors and value the idea of risk taking sometimes only within situational contexts. For instance, soldiers are expected to take risk in battle and demonstrate a heavy element of bravado and swagger, but then are expected to return to more refined civilian behavior and comportment after military service. Also, deterrence of risk behavior is only as good as the enforcement of policies and laws that regulate certain activities. If people do not believe they will be "caught," then risk taking ensues. If the price of being caught is relatively low (i.e., the price of a speeding ticket compared to hours saved in driving time over the year in the perception of the driver), then the safety advice or legal admonition is forsworn (Lonero, 1998).

A society that is permeated with scientific theory and technology does not handle uncertainty well (Douglas, 1992). Under the old paradigms of disease and bacterial causes of death, individuals were innocent "victims." In contrast, the risk factor trend is very personalized. People are no longer victims as much as contributors to their own negative outcomes. This is culturally unsettling for Americans (Douglas).

Risk Perception

The type of situations that inculcates the tendency of risk adoption can be described in the terms of "the domain of gains or the domain of losses" or the Prospect Theory (Kahneman & Tversky, 1979). The possibility and probability of loss must have some personal significance (Lonero, 1998; Yates, 1992). If a choice appears to be cloaked heavily in terms of possible gain, individuals will take the risk; if the same situation appears to have more potential negative consequences, most people are less willing to commit (Adams, 1999; Churilla & Baker, 2002; Kahneman & Tversky; Rolison & Scherman, 2002; Rosenbloom, 2003; Wolpert, 1996; Yates; Zuckerman et al., 1978).

Behavioral researchers find the threat of potential loss to be stronger, or has influential for decision making, than the potential for gains (Yates). The absolute risk or outcome may be the same in either situation; it is the perception of the risk that influences behavioral choice. Those who are generally risk averse perceive situations and activities to hold higher risk than those who rank higher as risk takers. Those who tend to seek out risks would consider the same event to be less risky (RiskPsychology.net, 2004).

Behaviors seen as risky by adults are not always perceived to be so by adolescents (Gonzalez & Field, 1994). This is not to mean teens do not understand the possible risks. Teens sometimes undertake activities on purpose, cognizant of the risk, to satisfy some other need. Jessor and Jessor's work in the 1970's outlined six probable causes typifying this adolescence angst:

> (1) to take control of their lives; (2) express opposition to adult authority and conventional society; (3) deal with anxiety, frustration, inadequacy, and failure; (4) gain admission to peer groups and demonstrate identification with a youth subculture; (5) confirm personal identity; and (6) affirm maturity and mark a developmental transition (as cited in Gonzalez & Field, 1994).

Thygerson described three factors that influence the perception of how much risk is present or potentially to be experienced if an action is undertaken: scale of the event, familiarity, and feelings of control (1986). One-time large events, like natural disasters, are overexposed by the media and create levels of concern disproportionate to other risks that are more likely to impact an individual's life. As the proverb states, familiarity breeds contempt. It becomes hard to appreciate the real risks associated with something when the object or activity is a daily or frequent occurrence (RiskPsychology.net; Thygerson, 1986). Control in this context means that if individuals believe they can handle the situation, they are more likely to take a risk. Ski slopes are playgrounds of natural beauty for frequent resort visitors; they may not be perceived as laden with risk.

Perceived Control

Teens who deal with risky behavior may develop ill-founded illusions of control (Caffray & Schneider, 2000). They convince themselves that things are OK via "self-talk" and believe that "everything will be all right." Such rationalizations provide a sense of control, when the situation may actually not lend itself to real control at all (Caffray & Schneider).

Ewert (1994) finds that recreational participants in high-risk sports balance their skills and behaviors. Control and influence are a large part of the experience . Risk-taking is not a part of the motivation. Sensation seeking, feeling a sense of accomplishment, achieving a goal or engaging in the activity take precedence. Ewert cites Watson's work which found experienced recreationists make better choices about activities than novices.

LeBreton finds a sensation of near lack of control motivates those who engage in the most extreme sports (2000). The tautness of the control link is what drives higher the sensation seeking of the experience. LeBreton refers to "playing symbolically with death" as an element that reinforces a self-imposed testing of character, courage and personal resources. Key to this experience is extreme hardship, overcoming significant obstacles and encountering suffering along the journey that grace the outcome with ultimate survivorship and distinctness of being. There is a mixed experience of anxiety coupled with rapturous pleasure of the experience. It is success hard won (LeBreton).

Optimistic Bias

Optimistic bias is strongly linked to a "control illusion." People think they have much more control over situations and events than they really do (Lonero, 1998). The

more success encountered, the more one believes that control is gained or achievable. Repeated luck and success lead to a mindset of being uniquely able to perform and encounter situations without risk, because "it's not going to happen to me." There is a strong tendency to depersonalize the personal risk and believe it only happens to others through a psychological protective mechanism (Lonero).

Ettlinger and Shealy raise the issue of whether the use of protective equipment on the ski slopes, such as helmets, feeds this optimistic bias (1999). Ettlinger is quoted by Skiing Magazine, "Think about the last time you were really flying down the hill, and ask yourself, 'Would I have been going that fast if I didn't have a helmet on?' The answer is usually, no." (Van Noordennen, 2005 ,pg. 86).

Motivators for Risk

Motivation affects risk situations. Personal motives can either be internally or externally centered. Internal motives can include emotions, self-esteem and a search to relieve boredom. External personal motivators may include monetary rewards, approval or disapproval of significant others, and the threat of possible punishment (Lonero, 1998). More than one motive is typically working at any given time.

Adolescents are motivated by potential risks that promise to enhance pleasant affective states or avoid negative ones (Caffray & Schneider, 2000; Churilla & Baker, 2002). They will not engage in the behavior, however, if there is a strong element of anticipated regret or a deep consequence of disruption in their desired future, if they do engage in the risk (Caffray & Schneider; Rosenbloom, 2003). Strong perceptions of risk can restrain some behaviors (Churilla & Baker; Rolison & Scherman, 2002).

Adolescents also engage in activities for their image among peers. This becomes less motivating as the participant gains in skill and experience (Ewert, 1994). Self-expression becomes more important than social factors with experience. The sense of personal accomplishment, the testing of self and the excitement of engaging in the activity come to the fore (Wankel & Berger, 1990). Increasing self-esteem decreases the overall need to take risks (Tursz, 2000).

Adolescent females tend to rely more on external cues to determine their perception of risk in a situation (Churilla & Baker, 2002). They feel safer if others are present or if protective equipment is at hand. Males feel safer in places with which they are most familiar. Perceptions do not match actual risk in either case (Churilla & Baker). The degree of risk is incorrectly estimated to be lower than actually present.

Experience strongly influences risk-perception. An inexperienced individual tends to make more risky decisions. Lack of experience fails to provide an adequate basis for decision making (RiskPsychology.net, 2004). Even a small amount of additional information can make a major difference in whether an action is taken or not. As more experience is gained, risk perception is less likely to be influenced by additional data or another repeated experience, unless it has a major impact on the overall consideration of the situation e.g. an eye-opening experience. A sense of overconfidence may thus develop, yielding a clouded perception of the actual risk. This can be dangerous (RiskPsychology.net).

Education and knowledge are factors in the risk-perception equation, but they do not exert the rigorous control over decision-making wished for by educators. Those with lower education levels tend to take more risks (Tursz, 2000).

Sensation Seeking

Sensation Seeking (SS) is the key concept in over 300 risk and risk-taking studies published over the past five decades (Deditius-Island & Caruso, 2002). It is defined as "the seeking of varied, novel, complex and intense sensations and experiences, and the willingness to take physical, social, legal and financial risks for the sake of such experience." (Zuckerman et al., 1978, pg. 27). Peaking in adolescence, SS is found in greater intensity in males.

Strong evidence links SS with risk taking. Those who inherently desire to experience greater thrills and adventure are generally the same individuals who participate in risky activities. Those pursuing high-risk sports, such as skiing, have been determined to have higher than average SS scores (Bouter et al., 1988; Cronin, 1991; Goma I Freiananet, 1991; Malkin & Rabinowitz, 1998; Rossi & Cereatti, 1993; Schrader & Wann, 1999; Slanger & Rudestam, 1997; Westbury, Pates, & Maynard, 2001; Zalenski, 1983; Zuckerman, 1983). A limited meta-analysis of SS in four snow-sport research studies found that the natural decline of SS after adolescence did not extend to the athletes in these studies; SS remained higher for much longer (Robinson, 2003b).

High scoring SS individuals approach new situations with a positive outlook and eagerness to explore. Such individuals may perceive the world as less threatening and themselves as having elements of control and skill that enable them to take risks (Horvath & Zuckerman, 1993; Jonah, 1997; Rosenbloom, 2003; Rossi & Cereatti, 1993; Schrader & Wann, 1999; Slanger & Rudestam, 1997). Though some sports require some physical risk taking, the risk itself is not what motivates the athlete, but

rather the sensation that is experienced while doing it. Many risk takers acknowledge that risk is generally present, but not influential for those skilled in an activity (Horvath & Zuckerman). They accurately perceive the risk, but engage in the activity for the potential rewards gained by the experience (Zuckerman, 1994).

Theun found Norwegian adolescents with high SS scores have lower safety-seeking behaviors than their peers (1994). They also scored higher as risk-takers. The Thrill and Adventure Seeking subscale of Zuckerman's SS scale was most predictive of the risk taking tendencies of these teens. Rolison and Scherman also found this relationship with SS scores more predictive of risk frequency than scores on a perceived risk scale (2002).

Injury Causation

A considerable body of evidence links risk taking with injury causation. Injury is more likely to be sustained by risk-taking individuals, except for those who are highly skilled in specialized high-risk sports (Pakkari et al., 2001; Smith et al., 1992; Turner et al., 2002). It is hypothesized that high skill level competitors do not attempt risky maneuvers for which they are not fully trained (Anshel, 2003). Smith, Ptacek and Smoll found that athletes low in SS have a statistically significant higher risk of injury than those with high SS scores.

Turner and associates (2002) emphasize that proxy measures of risk do not provide the same level of evidence compared to directly measured risk taking . Proxy measurements are collected from standard reports that are completed after injuries are sustained and include demographics. By comparison, direct measurements involve scales, personal interviews and measurements from case-controlled subjects.

Youthful Injuries

Pickett and colleagues found that youth reporting the largest number of risk behaviors are more likely to sustain an injuries four times greater than youth with no risk behaviors (2002). This was especially true for those sustaining more severe injuries. Contrary to popular notion, there was no significance associated with socio-economic status. Protective factors, such as social support from family or friends and material supports, do decrease the injury rate. The strong allure of peer group has been previously addressed. Environmental hazards contribute to causality of injury, but do not provide a complete accounting for injury occurrences. Rebellious and anti-social behaviors have the most predictive value for injury events in youth.

As discussed earlier, boys consistently demonstrate higher levels of risk taking than girls and consequently suffer more injuries (DiLillo & Tremblay, 2001). Contributing factors to injury include low levels of adult supervision, obstacles, lower skill level and poor attention. Common moderating factors include dominance behavior, physical exhaustion and concurrent stressful life events (Van Mechelen et al., 1996). Boys are less likely to use safety equipment, such as seat belts and bike helmets. Boys from higher socio-economic classes, however, do wear bicycle helmets more often than boys from disadvantaged classes (Tursz, 2000).

There is an implicit assumption in accident prevention literature that injuries are caused by errors in risk perception. Adams, a risk compensation advocate, however, counters that if a professional race car driver crashes at 200 mph, it is impossible to determine whether the crash was the result of a mistake or because the driver took a risk and was unlucky (1999).

Injuries are not always considered in a totally negative light when it comes to risk and risk-taking. A study concerning parental beliefs regarding the developmental benefits of childhood injuries, demonstrates that both mothers and fathers of toddlers believe children "learn from" from their experiences with minor mishaps (Lewis, DiLillo, & Peterson, 2004). Fathers adhere to this "it toughens them up" perspective more than mothers. Parents believe that negative experiences turn out to have silver linings which could be likened to gaining experience, control and perception of the world. Lewis and associates caution, however, that the preventative value of early experience discounts the fact that risky, error-prone activities are common in this age group and mostly do not result in injury. Parental attitudes about injury experiences do not vary with child gender, dispelling the common notion of differential socialization of children by gender.

Roles of Protective Equipment

Anecdotally, protective equipment changes behavior. Football players freely admit they hit harder and strike others more vigorously after pads are donned. Cyclists who adopt special hand protective cages admit that they are more willing to squeeze through a tighter path when using them than when previously unshielded (Adams & Hillman, 2001; Geller, 1996). It is commonly believed that safety equipment is voluntarily used by those more likely to be cautious or risk averse (Geller).

Researchers found that parents will allow their children to engage in riskier activities if protective equipment is part of the situation (DiLillo & Tremblay, 2001; Morrongiello & Major, 2002). In a study of 6 to 16 year olds (N = 63), 3 of 5 users of protective equipment for their sport reported doing things in a more "dangerous"

manner when wearing the equipment than not (Mok et al., 2004). For example, children rode their bicycles faster when wearing helmets. They felt more confident, safer, more aggressive, and more willing to try dangerous maneuvers in protective gear. Unfortunately, these results were not reported by gender or age. DiLillo and Trembllay's study (2001) did not support a belief that equipment use changed behavior.

In 1997 Braun and Founts conducted research for the US Forest Service to determine whether firefighters were more prone to accept greater risk if they carried a fire shelter (USFS --United States Forest Service, 2003). They concluded perceptions of personal danger were lessened with shelters, but rated the change as small. Most veteran firefighters felt this would only apply to new, less experienced crews. They cited the lack of experience, not training, as the most frequent cause of risk-taking at a fire scene. Small changes in human behavior, however, can account for a major tragedy in the uncertain environment of a wildfire (USFS).

The posting of risk areas and erection of safety barriers at winter resorts are rife with potential legal problems. When an obstacle is marked, people tend to be more cautious. If many obstacles are marked, an implicit assumption is created that other areas are somehow "safe" (Adams, 1999). The mandated use of helmets can imply that if an injury occurs, the resort is culpable for something that overcame the protection of the required gear. As such, the National Ski Areas Association and the National Ski Patrol do not endorse helmet wear, but encourage considered usage via their "Heads Up" and "Lids on Kids" campaigns. No controversy exists at the US Ski Association which mandates helmet wear at all national and Olympic competitions, as well as junior or disabled skier programs under its auspices (2005).

Risk Compensation

The suggestion that of safety equipment use induces even more risky behavior is a major argument of the Risk Compensation Theory (RC). This controversial theory purports that for every safety implementation, there is compensating or adjusting behavior that eliminates some, if not all, of the reduction in risk gained with the adoption of the safety equipment or behavior (Adams, 1999; Adams & Hillman, 2001; Wilde, 2001; Wilde & Robertson, 2002). The underlying tenet of this theory is that more risky behavior is adopted in response to a perception that more protection is offered by the equipment. This behavior then translates into an increase in overall risk for the individual and to others around him who would not otherwise have been at risk (Dennis, 1994; Wilde, 2001).

Adherents to the RC theory believe mainstream researchers do not acknowledge the RC stance. They believe there is an undue bias of perception of safety equipment as having few negative aspects (Baker & Teret, 1981). Mainstream researchers agree that delving deeper into the behaviors of why injuries occur and the consequences of safety policies and equipment can move the field of injury research beyond merely counting the number of broken body parts (MacKenzie, 2000).

Risk Taking in Snow Sports

Cartoons and media representation of snow sports invariably depict someone on crutches and/or with a cast. Chalmers would agree that many believe "injury is just part of the game" (2002, pg. 22); risk taking is inextricably part of those injuries.

Participant evaluation of their own personal risk while snowboarding (N = 256) was included in a larger scale study by Langran in 2003. He used four different events

on the slopes (speed on-piste, jumping, riding a half-pipe and using a tow lift) to measure young adult perception of what constituted risky maneuvers. Half-pipes were considered riskier than jumping. Speed was rated only slightly to fairly risky, below that of jumps and half pipes. These insights by those with only eight weeks of experience indicate that even beginners calculate and categorize risks they encounter on the slopes.

Goma (1991) investigated SS scores in conjunction with other personality trait scores in high-risk sportsmen. Four groups were compared: alpinists who climb above 8000 meters (N = 27); other mountain sportsmen, including skiers (N = 72); sportsmen in other risk sports (N = 221); and, controls not involved in any risk activities (N = 54). All sportsmen scored higher than the controls. Effect sizes for Goma's study finding mountain sportsman scored a small-moderately higher SS propensity than all the other sports athletes (d = .35), including lower scoring alpinists (Robinson, 2003b).

Schrader and Wann (1999) found gender and socio-economic class were not predictor variables for participating in risky sports. However, SS was a predictor variable correlated with degree of involvement in high-risk recreation groups (r = .23, $p < .005$). Skiers represented 18 of the 99 high-risk group subjects. Effect size calculations found SS scores significantly exceeded age and college age norms for this skier group; hence, published norms may not hold for snow sports participants (Robinson, 2003b).

Zalenski's (1983) cross-sectional study used both SS and a choice dilemma questionnaire to stratify subjects into high, medium or low risk takers. Three male (N = 60) participant groups were tested: professional rescuers (including ski patrollers),

risk sport participants including skiers, and controls matched for age. The professional and sports groups scored higher than the control group. An effect size calculated for the professional rescuers was a negative value (d = -0.68) indicating they are less influenced by their SS tendencies than the people they rescued (Robinson, 2003b). This leads to the conclusion that rescuers cannot be included in studies as peers to recreational skiers because they score a standard deviation differently on the SS scale.

In an unpublished master's thesis, Connolly compared SS scores of instructors and skiers, correlating them with self-reported injury rates (1981). He found those with more accidents and injuries tended to have higher SS values, including the instructors. As noted earlier, this finding is contrary to the general sports trend of fewer injuries among the more adept athlete. Importantly, general sport studies typically involve coached and monitored team and individual athletes. Recreational skiers are not usually coached.

Likewise, Made and Elmqvist (2004) found a tendency for more head and neck injuries to occur among snowboarders who rated themselves as advanced riders . They were found to do more jumping, airborne maneuvers and off piste skiing, which carry a higher risk. They also categorized themselves as higher than usual risk takers on an unavailable visual analogue scale tangentially mentioned in the report (Made & Elmqvist).

Snowboarders also scored significantly higher than controls on a series of risk measurement tools given by Cogan and Brown (1999). Snowboarders, as high arousal seekers, searched out more complex recreational experiences than those who were risk averse. Snowboarders were aware of the consequences of their behaviors. They did not

differ in their ability to plan goals and recognize possible outcomes when compared to the safe sport participants. Boarders were not impulsive in their actions, but rather cunning in ability to consider what to do and how to minimize risks. Both controls and snowboarders reacted equally to disappointments and frustrations within their sporting events (Cogan & Brown).

Cogan and Brown (1999) also discussed the motivational aspects of snowboarding. They did not place sole emphasis on SS or arousal as the primary motive in engaging in the sport; rather, the primary focal points were mastery over the environment and possible use of the escape value of the experience in coping with day-to-day life. "Living close to the edge", but not going over is rewarding for snowboarders (Cogan & Brown).

Echo Boomers

The sample involved in this study comes from the population group colloquially known as the "millennials," "Generation Y" or the "echo boomers" (Kroft, 2005). Considered the most researched generation of all time, core values of these individuals are more conservative, optimistic, community minded and moral than their predecessors (Alch, 2000). As such, it is unknown whether the standardized tests and norms used in research and based on the parental baby boom and earlier generations will be as a reliable in social science research. Will results be skewed due to differences in perceptions and approaches to life? Would they be different than their self-absorbed, excuse-laden, anti-authority predecessors of Generation X?

Echo boomers are multi-taskers who live with constant musical input, rapid communication and internet access. They have been conditioned to please parents and

friends (Kroft, 2005). Like previous generations, they take input from peers, but reject the rebelliousness and anti-conventionalism of the parental baby boom generation. Having been immersed in media since birth, they are less likely to respond to commercial images and pre-packaged presentations without an element of doubt.

Echo boomers have a strong work ethic, but little awareness of where their true talents lie and where they should not tread. In an atmosphere where every child is given a trophy, no one understands actual achievement or a real sense of true skill (Alch, 2000; Kroft, 2005). They have always received positive reinforcement and believe they are capable of many things without regard to actual talent.

Milllennials are used to being told what to do and when to do it (Alch, 2000; Kroft, 2005). They have been molded to be team players. Their over-scheduled lives have resulted in difficulty dealing with free, unstructured time. They require ever changing activities to maintain attention and have a preference for visual and physical sensory input.

Rationale for Use of Frameworks

The calls for snow sport helmet wear are no longer opinion pieces, but are supported by research demonstrating significant reduction in risk and degree of injury. What is unknown is why individuals do or do not adopt such safety gear. Because snow sports are regarded as high-risk activities, it is important to determine whether the use of helmets engenders more risk.

Ambivalence infuses any health behavior decision. Motivators and barriers help define potential markers for intervention programs. The synthesis of bicycle literature provides potential insight into the barriers and motivators for wear in snow-sports.

Interventions, however, must be based upon the viewpoints of those actually engaged in the activities, not imposed from without. For youth, it is critical to allow direct expression. This sharing of perceptions is best done among social peers. It follows, therefore, that a study must be done with a participant focus that goes beyond enumeration and description of injury types and seeks their direct input on these theoretical issues. It is also wise to determine if the characteristics of the generation coming of age in the new millennium help interpret the findings of the study.

OPERATIONAL DEFINITIONS

Echo Boomer: Individuals born in the later 20th century and coming to maturity in the new millennium; genetic offspring and demographic echo of the baby boomers.

Helmet Use: The wearing of a snow sport helmet while engaged in snow sports greater than 75% of the time for at least three consecutive visits to a winter sport resort.

Recreational Participant: Skiers and snowboarders engaged in activities for personal entertainment and not currently involved in organized team competitions. Within the study, these individuals are also referenced as snow sporters. Paid or volunteer resort employees specifically ensuring guest safety and instruction, such as patrollers and snow sport instructors, are not recreational skiers.

Risk: The probability of negative or less desirable outcome due to a hazard, decision or perspective particular to a situation (Rohrmann, 2002)..

Risk Attitudes: The contextual and situational tendencies of an individual to take or avoid risk behaviors (Rohrmann, 2002). Individuals can be risk aversive (avoiding risk) or have risk propensity (tendency to take risks) within situations. This is not a

trait, but a state (RiskPsychology.net, 2004) measured with the Risk Orientation Questionnaire (ROQ).

Risk Domains: Independent social and personal arenas of life where risk is encountered. Rohrmann (2002) outlines four heterogeneous domains of risks: financial risk, physical-illness risk, physical-accident risk and social risk. Financial risks include those associated with finances and gambling. Physical–illness risks refer to hazards and characteristics which can impact long term health and chronically harm, such as unsafe sex and smoking. Physical–accident risks infer harm potentials, such as speeding, hazardous jobs and risky sports. Social risks include relationships and activities running counter to socio-cultural norms and expectations. (Rohrmann).

Risk Motivation: Influence on behaviors when facing a risk situation. Motivations differ for each risk domain. The Risk Motivation Questionnaire (RMQ) measures thoughts and feelings surrounding the risk behaviors of a particular situation (RiskPsychology.net, 2004; Rohrmann, 2002).

Sensation Seeking: "The seeking of varied, novel, complex and intense sensations and experiences, and the willingness to take physical, social, legal and financial risks for the sake of such experience." (Zuckerman, 1994 pg. 27). The Sensation Seeking Scale Version V (SSS-V) will be used to measure this.

Snow Sports: Activities typically practiced in winter sports settings. Within this study, limited to alpine skiing and snowboarding occurring within designated resort boundaries during formal season operations.

CHAPTER THREE: METHODS

This mixed methods study had sequentially administered arms. First, three risk attitude measurement tools were completed in a quantitative arm (QUAN) followed by a qualitative focus group session (QUAL). Analysis of each arm was undertaken independently. The study's QUAL driver dictated that the focus groups be analyzed first to decrease any potential bias in recognizing findings emerging from the data by preconceived notions drawn from any QUAN findings. Inferences drawn from each method were then compared to gain additional insights gleaned from different lenses.

Research Questions

Directional hypotheses would be premature within this exploratory design. The intent was to gather information useful for interventional programs concerning helmet use in snow sport recreational level athletes. This study sought to learn how informants perceived risk within their sport and how they viewed themselves as participants in a sport generally deemed risky by others. It explored whether there were relationships among demographic variables and/or helmet use and the risk attitude scores of the participants. Specifically it explored: a) Do youthful snow sport participants believe they are risk takers?; b) What aspects of their sport are perceived to potentially hold risk?; c) What motivates them to take risks?; and, d) How do participants respond to suggestions to wear helmets?

Sampling and Recruitment

Convenience and snowball sampling techniques were used for both study arms. Additional theoretical sampling beyond the initial focus groups was planned, but was deemed unnecessary after QUAL analysis. A total of four 12 member groups, ages 15-

30, were recruited. A mixed age demographic was desired with the following representations in each group: a) helmet users and non wearers; b) males and females; c) skiers and snow boarders; and d) those over and under age 18. Initial IRB clearance was for N = 50.

Initial preferential recruiting over-selected those with lower representation on the slopes, especially skiers. Rigid adherence to the desired percentages was not maintained in the interest of conducting all focus groups within one month and to limit drop out rates. A planned 20% over-recruitment strategy was employed to accomodate typical focus group no-show rates. A greater than expected no-show rate triggered the need for additional recruitment to meet the planned sample size. Twenty-five individuals completed both arms of the study; a similar number completed only the risk attitude tool portion. Demographic and aggregate risk scores of those completing the QUAL only portion of the study were compared to those recruited only for the QUAN arm to evaluate parity.

Inclusion and Exclusion Criteria

Inclusion criteria covered recreational participants between ages 15-30, who actively pursue snow sport recreation at least three times in a ski season. Individuals excluded from the study were: a) persons and/or the families of those directly involved in the retailing and marketing of snow sport helmets; b) those unable to reasonably speak English for the focus groups; c) those unable to read at an 8th grade level for the risk assessment tools; d) teens voicing dismay about coercion to participate; e) those engaged in snow sports other than alpine skiing and snowboarding; f) those currently enrolled in organized ski racing/competition groups mandating helmet wear; g) those

apparently under the influence of alcohol and/or other mind-altering substances; h) individuals enrolled in disabled skier programs; i) individuals given medical mandates for helmet wear; and j) ski patrollers, ski instructors and safety guides.

Recruitment Strategies

The matrix used in tracking the sample distribution recruited for the focus groups was amended as drop-outs occurred between the time of recruitment and the scheduled focus groups. It was planned that if more than the anticipated number of participants showed for a session, they were accomodated so long as the group number did not exceed 12. No reporting number was less than four, so rescheduling of groups did not occur.

The failure to show rates for the first focus groups (16 of 24 confirmations) cannot be explained other than as the vagaries of college students. Inquiries among faculty at the university site where most of the students were recruited confirmed this pattern as typical for scheduled office visits and other out-of-classroom activities. Follow up e-mails yielded vague excuses of forgetfulness, despite recurrent pre-group contact, including the day before the sessions. Several teens missed sessions when their high school football team unexpectedly qualified for the state playoffs. The significant failure to show rate on the second date (11 of 24) was directly attributed to the unexpected and early first day of skiing after a previous year of no snow. Confirmed participants opted to go skiing instead.

Getting the Message Out. Posters soliciting participants were placed in university hallways, local sporting goods stores and equipment rental shops. Personal contact was made with local high school administrators. An announcement was placed

in the campus want ads to solicit students and faculty family members for the project. A recruitment table was secured at the opening day of school at the Student Involvement Fair. The largest number of focus group participants came from this table and from snow-ball techniques. Some QUAN only members were directly solicited at a local ski resort lodge.

Screening Guide. An inclusion and exclusion criteria based matrix sorted individuals responding to the call for participants into data collection groups. Re-screening of respondents at the opening of each session confirmed that those present met the specified criterion. It also gave the participants another opportunity to opt out of the study.

Compensation. Participants were compensated $25 for completion of both study arms. Those completing only the QUAN portion of the study received $5. Several declined payment, but checks were still provided with a suggestion for charitable use.

Data Collection Procedures

Demographic data was collected via preliminary paperwork before administration of the risk tools, but after the receipt of informed consent/assent documents. For minors, accompanying parents or guardians departed the area after the consent procedures so that the study participant was free to voice their own opinions without coaching or non-verbal influence. Contact information was destroyed after study completion to maintain confidentiality for those not consenting to future contact.

Three risk tools were administered prior to the focus group sessions. It took less than 30 minutes from the time of consent until all forms were completed. Each participant's papers were enclosed in a separate folder at the time of collection. For the

focus groups, refreshments were provided during tool completion. A rest break was offered prior to the short walk to the TV studios. Compensation checks were provided at the end of the focus group sessions. The first two focus group sessions were directly monitored by the Dissertation Committee Chair to ensure adherence to procedures. No modifications were necessary.

The procedures for those only agreeing to the quantitative arm of the study matched that planned for the focus groups through tool administration. Most of these participants did not meet as a group, but completed their forms on an individual basis. Compensation checks were provided after the forms were submitted. These participants were not allowed to observe the focus groups.

Risk Taking Tools

Three pen-and-paper risk attitude tools were used in sequence: the Risk Orientation Questionnaire (ROQ), the Risk Motivation Questionnaire (RMQ) and Zuckerman's Sensation Seeking Scale (SSS-V), the workhorse for hundreds of risk related studies for more than five decades. The ROQ and RMQ address some shortcomings of previous personality trait based tools that do not recognize the multiple domains of risk or the situational variability inherent in risk motivation and behavior, but do not have a pedigree of usefulness as the SSS-v (Rohrmann, 2002). The study is exploratory, providing opportunity for the use of these newer tools to gain insight into a phenomenon with the intent of further development within a program of research. All tools, however, used have been endorsed as useful for understanding health behaviors (Harrison, Young, Butow, Salkeld, & Solomon, 2005).

Risk Orientation Questionnaire (ROQ)

The ROQ is a 12-item questionnaire presenting statements and asking for a level of agreement on a 7-point likert scale (Rohrmann, 2002). A summated rating score is derived for ROQ-Risk Propensity and ROQ-Risk Aversion (cautiousness) to account for situational tendencies that correlate negatively with each other. Different subscale items are interspersed to avoid answer pattern bias. The ROQ correlates with other risk scales at $r = .40$ to .60. Those scales, however, are one-dimensional in measuring risk propensity, demonstrating the increased usefulness of this two-factor tool. The ROQ correlates $r = .50$ with Zuckerman's SSS-V indicating that the two overlap, but do not measure, the same construct. "Risk propensity induces actions which may or may not lead to novel situations" (Rohrmann, 2002 pg. 16). See Appendix A.

Risk Motivation Questionnaire (RMQ)

The RMQ explores to what degree people are inclined to take a risk using a five-point likert scale. The RMQ asks what induces people to engage in risky activities and uses independent subscales to explore the four domains of risk taking. Subscales PA (physical risk—accident) and PS (social risk) with a total of 31 items were used. The PS subscale comprises more than the facet called Social influence; it is composed of several items concerning social activity. Though some questions are found on multiple subscales, all domains have been differentiated by this scale in terms of perception of negative outcomes, as well as attractiveness to engage in a certain activity (Rohrmann, 2002). Tool preparation removed the likelihood of asking any item twice. (Appendix B).

The RMQ focuses respondent answers by specifically requesting degrees of motivation for a directed situation. In this case, the reference focus was clearly defined as being a typical day on the slopes. The types (facets) of motivation measured by the RMQ are: a) ES (Experience-seeking and Self-enhancement), 8 items measuring self-confidence and satisfaction in the testing of personal limits; b) EX (Excitement & Pleasure from being at risk), 4 items including thrill and enjoyment of being "at risk:" c) PE (Physical Enjoyment), 2 items dealing with bodily feelings; d) PS (Prestige-seeking), 3 items involving proving self to others and attracting attention; e) SI (Social Influences). 6 items capturing peer pressure and perceptions; f) IN (Inertia & Lack of Time or Means), 6 items exploring the balance of time and cost to use safety practices; g) UE (Under-estimation of Hazard & Inexperience), 3 items determining whether an activity is seen as hazardous with the severity of consequences; and, h) IR (Irrelevance of Risk Avoidance), 4 items measuring despondency, gloomy attitude and self-deprecation links.

Sensation Seeking Scale Version V (SSS-V)

The SSS-V is a 40-item attitude questionnaire presenting statements and asking for agreement on a dichotomous, forced choice format (Appendix C) The preference of A or B in the items indicating SS tendencies is carefully designed in presentation to the respondent to preclude answer pattern bias. Scores are calculated using four sub-scales: Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Boredom Susceptibility (BS) and Disinhibition (DIS). These subscales can be measured together or in isolation (Zuckerman, 1983). The TAS measures involvement in physically risky activities. It is summarized in the item "I sometimes like to do things that are a little frightening." The

ES subscale assesses the desire to experience novel situations through the mind and senses, such as music, art, travel and drugs. The BS subscale determines rejection of repetitive and routine events in situations when such constancy is unavoidable. Finally, the DIS subscale covers more social aspects of novelty experiences through drinking, sex and parties. The subscales are moderately and significantly correlated with each other (r = .31 to .47, N = 2000) (Zuckerman, 1983).

The total SS and subscale scores are expected to diminish with age and are found more often and more strongly in young males. Compelling evidence exists that SS is linked with risk taking. Those who inherently desire to experience greater thrills and adventure are the same individuals who participate in activities deemed risky. When athletes are tested, the typical gender difference found in general populations becomes statistically insignificant and SS tendencies do not diminish with age as expected by national norm patterns. Education does not influence SS scores (Zuckerman & Neeb, 1980). These scoring patterns are similar throughout many cultures (Aluja, Garcia, & Garcia, 2003).

Reliability of Instruments

Stability, internal consistency and equivalence are the three cornerstones of reliability (Polit, Beck, & Hungler, 2001). Stability is provided by test-retest reliability data on the same participants. Internal consistency considers whether all scale items hold together and measure the same characteristic. Equivalence, which is used for observational instruments, addresses inter-rater reliability and does not apply to these scales.

Test-Retest Data. A reliability coefficient is used to determine the difference in scores over time. The higher the score, the more reliable the instrument is considered to be (Polit et al., 2001). Situational-context derived attitudes are expected to change over time, so stability becomes a less stringent factor for these scales. Independent factors, such as mood, knowledge, and experiences, can alter the responses over the typical three week period used to determine this reliability status (Polit et al.). Because the SSS-V is influenced more by slowly evolving developmental norms, test-retest data is more stable.

Rohrmann did not provide stability data for the ROQ and RMQ. Due to researcher concerns of data stability over time, a decision was made to preclude focus group participation on a different date than risk tool administration (Hulley et al., 2001). This allows use of the data in any future study that links specific focus group statements to specific risk tool scores—a task not undertaken in this study.

Zuckerman (1994) reports a three week retest reliability for the SSS-V of .94 for both genders. When the scale is broken into subscales, the following retest scores are reported with equal scores found for both genders: TAS .94; ES .89; DIS .91; and, BS .70.

Internal Consistency. Internal consistency measures whether all components of an instrument are measuring the same characteristic or concept (Polit et al., 2001). The higher the number of the Chronbach's alpha the more accurately it measures what the scale purports to measure. Work toward internal consistency has been demonstrated by revisions of all the scales over time.

Chronbach's alpha has not been supplied for the ROQ, but the factor analysis loadings for rotated Varimax and Oblimin are available, which demonstrate the validity of the two factor model, Risk Propensity and Risk Cautiousness. These factor loadings range from .34 to .71 absolute scores, showing a moderate to fairly strong coverage of the concept of risk attitude within the 12 items of the scale. No item scored below the universally accepted .20 loading cut-off score (Pett, Lackey, & Sullivan, 2003).

Rohrmann (2005) identifies 10 facets contributing to the measurement of motivation via factor analysis of the RMQ scale. The mean values for the main motivations for risk behavior were provided by the author. These mean values evidence differentiation for motivation among the four domains of risk. These means were originally derived from multiple studies with sample sizes totaling over 300 persons. The means range from 1.4 (on a scale of 5) for the least contributory factors of "Irrelevance of Risk Avoidance" to a mean of 4.1 for "Financial Gains" by domain.

The internal consistency of the SSS-V is reported by Zuckerman (1994) as alpha scores of .84 for males and .85 for females. The subscales are found to have the following alpha scores: TAS .81 for males and .82 for females; ES .65 for males and .67 for females; DIS .78 for males and .77 for females; and, BS .65 for males and .59 for females. Because the SSS-V is a forced choice scale, it will have lower internal consistency scores than a likert scale (Ray). Therefore, the above values have higher acceptability than the absolute scores would indicate. These alpha values also underscore the need to use more sensitive measures based on a likert scales.

The SSS-V Boredom Susceptibility (BS) subscale has the least reliability in studies of athletes and others who deal with socially approved risk activities; it has a

higher predictive value in those who participate in socially non-acceptable behaviors, such as drugs and unsafe sex (Deditius-Island & Caruso, 2002; Zuckerman & Kuhlman, 2000). Many studies delete use of the BS subscale for non-pathological populations. It is used in this study, because the RMQ also measures disinterest and boredom.

Condensing of information shared in most psychological publications stymied the efforts of Deditus-Island and Caruso (2002) in determining a meta-analysis level of reliability of the SSS-V scale. They determined the reliability of data synthesized from multiple studies using the SSS-V was marginal, but attributed this to the systemic problem of poor reporting and not reflective of a scale with five decades of use.

Sampling and Reliability. Reliability of tools is based on sample heterogeneity (Polit et al., 2001). The non-random sampling of this study skewed the probable heterogeneity toward homogeneity, however, due to the mix of genders, age and snow sport equipment preferences, enough variance existed to demonstrate differences.

Validity of Instruments

Validity is the degree to which a tool is measuring what it is intended to measure. Tools should possess face, content, criterion-related and construct validity (Polit et al., 2001). Face and content validity determine whether a tool appears to measure what it announces it does (Polit et al., 2001). This is not based on particular quantitative measures, but requires reference to the relevant literature to determine whether the tool reflects the proper representations of the subject.

Each tool used in this study has been revised several times, thus lending credibility that the current versions of the scales are better reflections of valid content than even their initial iterations. The fact the SSS-V is considered the premier

measurement of risk taking speaks to the face validity researchers have bestowed upon it over the decades (Deditius-Island & Caruso, 2002). The items of the ROQ separate those who tend to take risks from those who do not, based on the polarity of the questions. The RMQ determines which domain of risk influences an individual and to what degree, by asking how relevant multiple factors are for the decision to engage in a specified activity. The prepared study tool specified snow sports as the situation to be considered.

Criterion-Related Validity. This validity is determined by relationships to external tools or criterion. The ROQ demonstrates correlations of .4 to .6 for risk propensity and risk cautiousness with other risk scales, including Dahlbaeck Propensity and Dahlbaeck Cautiousness, Lindemann Propensity and Farley Propensity (Rohrmann, 2002). Coefficients of .70 or higher are desirable (Polit et al., 2001). These comparative scales are uni-polar, not multi-dimensional. It follows then that a scale more reflective of context and situational derived answers will not correlate well with scales designed to measure stable traits on a linear scale. These correlations, therefore, indicate the ROQ is not just a variant of other scales, but measures the concept differently.

The RMQ mean scores demonstrate the ability to measure validity by exploring the scores of risk motivation and risk attitude toward different issues and hazards. Of importance to health care research is the fact that the domains of physical risk taking motivations and risks which lead to chronic illness are clearly different (Rohrmann, 2002). The impact of social risk motivation is important for studies with adolescents (Pickett et al., 2002). Embedded in the RMQ is a social subscale to measure this.

The ROQ and RMQ should also provide insight about those who score higher on the SSS-V. The correlation between ROQ and SSS-V is .50, indicating that they do not measure the same construct (Rohrmann, 2002). Though not provided by Rohrmann, correlation between RMQ and SSS-V would be limited, because the SSS-V focuses on only one aspect of motivation.

The SSS-V stands as the standard against which other scales are measured. In its earliest iterations, SS was differentiated from impulsivity and the personality characteristics of introversion and extroversion. Risk Propensity, SS and Impulsivity were found to be associated, but they are not irreversibly linked. Both the SSS-V and ROQ correlate at .40 or less with Eysenck's Impulsivity Scale (Rohrmann, 2002; Zuckerman & Kuhlman, 2000). In studies of elite athletes, it becomes apparent that their actions are not impulsive, but rather well thought out. Other research on SS and impulsivity on known substance abusers established that SS and impulsivity were linked with a lack of premeditation and a lack of perseverance (J. Miller, Flory, Lynam, & Leukefeld, 2003).

Snow sport participation requires a certain degree of perseverance to master even the most basic of moves. The selection of a pathway down the ski slope requires at least a minimal premeditation to avoid the most obvious of hazards, such as trees and lift towers. Therefore, tools that are intended to increase understanding of psycho-pathology cannot be directly applied to normal populations, but can still serve as useful reference measures.

Focus Groups

Group Structure and Procedures

The principal investigator of this study did not conduct the focus groups. She is older than the participants and a ski patroller at the resort most participants attend, attributes which could inhibit the openness of conversation with the population of interest. Therefore, a professional moderator from a research firm was hired and cleared through IRB. The researcher authored interview guide was reviewed in face-to-face meetings with the moderator prior to the filming dates. Revision of that guide was solely under the control of the researcher.

Identification of Participants. Participants prepared a large name tag reflecting the self-selected moniker to be used during the discussion. The tag was sufficiently visible to the moderator and other participants to see. During transcription, the moniker was used to identify individual comments. This facilitated linkage of particular comments to a person during the analysis phase without the necessity of working around code numbers.

Interview Guide. The initial interview guide can be found in Appendix D. Open ended for preliminary topics, it assumed a more funnelled approach to questions as the session progressed. It was not intended to be followed lock-step, but directed the flow of conversation based on participant comments during the discussion. Thus, the flow of conversation unfolded uniquely for each group, but all questions were addressed by each. No changes to the guide were made between sessions.

Video Taping Session

Each group was escorted to the university TV studios, where they met the moderator. The self-selected seating was pre-arranged in a semi-circle, so all could be seen by others in the group, the moderator and the camera. The moderator initiated a conversation to facilitate sound and light checks by the studio crew and to enable participants to become familiar with her conversational style and the setting. Participants were given the option to leave if the setting was upsetting; none did so. Participants were advised when the filming commenced, which used VHS standard tapes. The camera panned across the group with occasional close-up views.

Observer Role. The researcher took notes from an unobtrusive vantage point within the director's box of the recording studio. She recorded process notes and memos for potential use during analysis. A description of the room and annotation of any particular environmental or other impacts on the session was included. A moniker-identified seating plot was made recording chair selection. No communication was intended to take place between researcher and moderator during filming, nor occurred.

Qualitative Data Analysis

Transcription

Use of Windows Media and a simultaneously opened Word document provided the venue for the researcher to transcribe line-by-line all four tapes. The seating plot clarified the attribution of a statement when multiple individuals spoke at once or torsos were turned to obscure reading the name tag. The video media enabled the researcher to record both verbal and non-verbal communication on the transcript page.

Coding

Numerous minor codes were assigned to topical ideas or themes in the data using N-Vivo software and pursuant to the standards of content analysis, After each script was coded, categorical codes (nodes) were added to generate clusters of like viewpoints. Care was taken not to rush into collapsing the number of categories early in the investigation, as this could potentially bias the coding of following groups. Early categorization can open the door to a false perception of saturation when it may not yet exist (Creswell, 1998; Polit et al., 2001). A concerted effort was made to examine each comment for the possibility of new insights and viewpoints not previously voiced, and consideration was given as to whether there was a need for further group exploration or additional groups.

Critical to the flow of analysis was a review of codes and nodes by the demographic variables. This second review by demographic umbrella helped reveal critical differences that could have become lost within summary information. Minority viewpoints were kept on the final thematic list to provide a holistic set of findings. These opinions must be considered for future tool development and not discarded during this exploratory stage. A tabulation of frequency of responses was not used to determine achievement of saturation of a particular theme. Quantitative manipulation of numbers does not fit within the paradigm driving qualitative designs (Morse, 2003).

Member Checking

In order to reconcile conflicts and opposition in viewpoints, the groups were asked to response to general statements made by prior groups as a form of member checking. Member checks also occurred when the participants bantered back and forth

the viewpoints provided by other group members. Participants were re-contacted as needed by the researcher to clarify a particular stance or obtain deeper understanding about a comment. No new data was obtained this way.

Expert member checking by national ski patrollers consisted of reviewing blinded portions of a transcript to determine whether those viewpoints rang true. They also reviewed drafts of Chapter 4 for the same input. Peer member checking occurred through classroom and written feedback by other students and faculty in the doctoral program. Critical attention was paid to keeping true to the scripts, inclusion of minority views and appropriateness of selected exemplars. Additional theoretical sampling was deemed uncessary after completion of the four focus groups.

Quantitative Data Analysis

Procedures

At the time of data entry, each participant's demographic sheets and consent forms were separated. Only the participant's coded identity was transcribed onto the risk tool forms. The raw data was entered into a SPSS data base for statistical analysis only by that code. The files were labeled only by code number.

A contingency plan was designed such that if someone failed to complete any tool, the data from the other tools was still used in the final analysis. Two participants failed to complete one page of a tool. Following the most commonly accepted method of handling missing data in research studies, the combined average of all similar age groups and gender participants was calculated by SPSS for each item and substituted for that missing data.

Statistical Analysis

The demographic factors were primarily nominal and ordinal scaled data. The responses for both the ROQ and RMQ were ordinal scaled measurements. The SSS-V had dichotomous responses. Descriptive statistics were used to present specific parameters of the sample to include frequency distributions, measures of central tendency and variability (range, SD), and contingency tables. As is common in most studies that do not adhere to rigid random sampling techniques, some basic inferential statistics were planned to be used, including the non-parametric tests of Chi-Square and Spearman's Rank Order Correlations (Polit et al., 2001). The tool authors and other researchers had presented RMQ, ROQ, and SSS-V data as if interval in other research studies. As such, inferential statistics were incorporated into the analysis section, including differences of means (*t* tests and ANOVA) and Pearson's Correlations. The research questions did not include directional hypotheses and were not tested to determine support or non-support of their statements.

Inference Generation with Mixed Methods Design

This was a mixed methods design; therefore, each arm of the study had specific inferences that emerged from each approach to the data. Per traditional approaches to triangulation, they were compared to allow further inferences to be drawn for a deeper understanding of the topic. Expert checking ensured that the inferences drawn did not violate the general principles associated with the sport or with the methodologies.

The study design prevented computation of risk scores prior to the start of focus group filming. Some participants voiced they gained a general insight into their own risk taking through the process of completing the forms. This insight was purposely

integrated into some of the more structured questions and preparatory statements provided to the group to help stimulate conversation. One transitional phrase was: "Many skiers consider themselves risk takers. What do you think about that?" Rather than prejudicing responses, such insights met participant expectations because the subject of risk-taking was well described as the focus of the study during recruitment and obtaining of consent.

Participant demographic and risk scores were treated as aggregate data. Individual risk scores were not isolated and compared to verbalized opinion during analysis. The scope of the present study was not intended to reach this level of specificity. Participants were never given their personal results.

Trustworthiness

As a mixed methods study with a qualitative driver, the approach to validation followed the pattern of other qualitative studies. How the issues of credibility, dependability and transferability were used in study is outlined below.

Credibility

Confidence in the qualitative data is enhanced by the way the data is collected (Polit et al., 2001). Focus groups deliver believable data, because the population of interest freely provides unfettered opinion about the topic. The use of method triangulation plays into this credibility (Polit et al.). Because quantitative data findings are integrated into the sequence of analysis, multiple perspectives are used to gain a deeper understanding of the issues. The incorporation of expert member checking also increases credibility. Using multiple methods, therefore, provides a convergence of information that yields a sense of truth (Polit et al.).

Focus groups do not lend themselves to prolonged engagement when compared to extended field studies, but do allow a much longer contact time with subjects than a survey or questionnaire (Greenbaum, 1988; Mariampolski, 2001; Stewart & Shamdasani, 1990). Member check techniques that incorporate previously derived opinion trends into the discussion of follow-on groups extend that engagement with the population niche. Member checks have been credited as the most important technique for establishing credibility (Polit et al., 2001).

Credibility is also established via the search for negative or alternative opinions (Polit et al., 2001). Care was taken to ensure that minority or rarely occurring voiced positions were not discarded, but were incorporated into the ongoing analysis and interpretations. The moderator specifically addressed the concerns of those who appeared to stand in opposition to any group consensus. They were assured that they had valid opinions. Minority opinions were included in the final report in order to provide a complete picture of the topic.

Finally, credibility is enhanced by the researcher's expertise in the area of snow sports and neurological trauma care (Polit et al., 2001). The discussion section includes the researcher's biases or perceptions that could conceivably alter interpretations of the data, thereby giving the reader insight into the possible skewing of the report results (Polit et al.).

Dependability and Confirmability

The audit trail of theoretical notes and records of data analysis procedures provides an account of the stability and the stepwise replication possibilities of the study (Polit et al., 2001). External reviewers, in this case the Dissertation Committee

and peer reviewers in the Dissertation Seminar, provided scrutiny for adequate documentation for how the codes were derived and the adequacy of documentation. Expert member checks provided insight concerning probable replication of findings from other snow sport enthusiasts. The objectivity of the findings agreed upon by those other than the primary researcher is enhanced by these external reviews. Thus, the findings presented have been deemed dependable through this confirmatory process.

Transferability

The extent to which these findings can be used in other settings is dependent upon the strict adherence to inclusion and exclusion criteria of the study and a detailed accounting of the findings that support the inferences finally drawn in the results sections. Rich and thick descriptions are presented so that conclusions can be drawn independently by the reader. Transferability is best considered using the four kinds of transference cited by Tashakkori and Teddlie: ecological, population, temporal and operational (2003). The definitions of these terms are found in Chapter Five preceding their use. Suggestions for transferability are provided in suggestions for incorporation of the findings into ski safety programs.

JUSTIFICATION SECTION

Academic convention requires justification for the use of methods and tools within the dissertation. This section provides summarizes these choices.

Justification of Mixed Methods

There is a long history of using qualitative and quantitative research methodologies together, especially in the areas of marketing and tool development. The impetus for this dissertation is to gather information for follow-up research, including

tool development and interventions based on emically derived information from the population of interest. Other researchers have also embraced the use of mixed methods in order to overcome any weaknesses or inadequacies in approaching the topic with only one lens. In this way, a deeper understanding and a more critical analysis of the findings can be undertaken prior to application or transference (Tashakkori & Teddlie, 2003; Williamson, 2005).

The use of mixed methods is frequently called triangulation. It recognizes that people are complex beings. It does not relegate the participant to being just an anonymous, box-checking automaton without emotion or appreciation of the constituent ideals, values and ambivalences associated with a particular provided answer (Fontana & Frey, 2000). It behooves the researcher to gather as much information from as many sources as possible, to gain a deeper appreciation and understanding of participant lives and input (Denzin, 1970; Fontana & Frey; Morse, 2003; Thurmond, 2001).

Richardson proposed the use of the term "crystallization" instead of triangulation for mixed approaches (as cited in Janesick, 2000; Lincoln & Guba, 2000). Rather than view an issue from a two-dimensional geometric perspective, a topic should be viewed as a prismatic reflection of light as it passes through a crystal. This viewpoint is different from every angle. What is seen is more deeply appreciated when viewed from multiple perspectives (Denzin, 1970).

Justification for Use of Focus Groups

Focus groups are best used to gather opinion and viewpoints from many people in an effort to gain a broader understanding of phenomena. They are used to elicit

valuable information from people about a topic of common interest. In skiing circles, there is a camaraderie that comes from sharing exhilarating experiences on the slopes. This culture involves the sharing of exploits. The sharing of stories lends itself to group work for sharing opinion.

Within the snow sports world, there is also a quasi-counterculture of snowboarding that has undertones of defiance of norms and anti-authority stances toward rules and regulations. This stance has softened with the integration of the sport into most families and the recognition of the sport on the World Cup and Olympic stages. Because the snowboarding culture is predominantly young adult and adolescent, peer pressure and group interaction are major influences on individual action and perception. The use of focus groups fits this model well.

Justification for Use of Risk Measurement Tools

The realm of risk research has made major strides in the recent past with the generation of scales measuring risk propensity and risk behaviors. Though the first tools were generated from financial risk perspectives or personality trait theories, they are now refined to measure the situational and circumstantial degrees of risk an individual will tolerate in four risk domains. The use of these tools enables the study to progress beyond obtaining personal opinions, but to link those perspectives with replicable measures. The basis for selection was presented in the tool section above.

Limitations of the Study

Several potential limitations of this study were foreseen. Issues of mixed methods design have been discussed earlier including sampling, order of interactions, internal validity/credibility and external validity/transferability. The expertise of the

researcher can weigh significantly on the quality of findings, hence, it is important to establish the researcher's qualifications to undertake this design.

Researcher Expertise

This study was the first undertaken by the author as the lead researcher. Because the project was undertaken while still within an academic environment with close supervision of a committee, this limitation was somewhat mitigated. This lack of experience also engendered a more considered approach to each section than that which might be given by more experienced researchers. The dissertation committee was composed of doctorally prepared faculty with experience in mixed methods, focus groups, risky behaviors and behavioral change.

The author also brought strengths to the study. She has successfully coordinated several complex projects of a major scale. She completed all the core courses for both a qualitative and quantitative approach to research studies. She actively assisted in the coding and interpretation of qualitative data from several graduate and post-doctoral peers. She has personally supervised the collection of quantitative data for several medical research studies conducted in emergency room and critical care settings. She has designed and conducted multiple informal and continuous quality improvement (CQI) projects on the nursing units she has managed. Such CQI projects draw heavily from the same processes as clinical research studies.

This author's largest strength derived from her 18 years of international experience as a ski patroller. She concurrently held the position of Lead Instructor Trainer and First Aid Room Supervisor for a premier ski resort. She supervised the care of 30+ patients per weekend day, four typically requiring helicopter or ambulance

transport. She has been honored as the Most Outstanding Auxiliary Patroller for the Pacific Northwest and holds the ultimate level of national recognition (#8261) within the system. Combined with her 30+ years experience as an emergency room and critical care nurse (with a special interest in neurosurgical patients) and her continuous national certification as a CCRN since 1978, she was uniquely positioned as a subject expert. Her nine year certification as a Family Nurse Practitioner also facilitated her interest in preventative care issues.

HUMAN SUBJECTS REVIEW

This study required clearance for human subjects review from two universities, OHSU and PLU. The Institutional Review Board (IRB) of OHSU served as the overseeing review body. Formal transfer of oversight to OHSU was granted by PLU in the spring of 2005. Final proposal clearance was granted to protocol #e1483 in August 2005 (see Appendix E). Subject recruitment commenced thereafter. The study also required permission for recruiting on the private property of the major ski resorts within the region and at a local high school. Both were facilitated by key members on the high school faculty and the local ski patrol.

Benefits to Society

The foundational literature supporting this study overwhelmingly demonstrates the disturbing trends of sustained, perhaps accelerating, rates of neurological trauma associated with snow sports. The USCPSC evidence review unequivocally states over two-thirds of all head traumas occur in the region of the head protected by helmets (Consumer Product Safety Commission, 1999). Interventional programs with bicyclists and other health behaviors repeatedly demonstrate that unless the barriers and

objections raised by the specific population of focus are addressed within that intervention, few gains are made in improving community levels of health and safety (Attewell, Glase, & McFadden, 2001; Whitehead & Russell, 2004). This study explores risk-taking and helmet wear in snow sport participants from their own perspective. Therefore, the major benefit gained is in establishing evidence for interventional programs within the snow sport field.

A second benefit is the additional evidence gained in the developing field of risk attitude research. Risk taking is linked with injury rates. Risk propensity and sensation seeking can be measured as a situational and contextual state. Gaps exist between measuring risk propensity and any subsequent link to health behaviors that are influenced by risk attitudes. The tools to measure risk motivation key into the potential use of results in intervention programs. This study takes a step toward uncovering some useful linkage between the adoption of safety equipment and risk scores by asking participants if helmets influence their behaviors on the slopes.

Informed Consent

All participants volunteered for this study. Adults were given an informed consent form (Appendix F); minors assented only after parental consent was obtained (Appendix G). Students under age 18 who independently contacted the researcher were required to provide phone numbers for their parent(s). A telephone interview with each parent preceded submission of the consent forms for their consideration. The signed consents were in-hand prior to any data collection, including the Demographic Form (Appendix H).

Participants were informed during the screening and prior to the data collection periods that they had the right not to participate or to refuse to answer particular questions. They also had the right to ask questions. Only two types of participants had their contact information retained after the sessions: a) those who agreed to future contact for further data collection or analysis processes with this and/or future studies, and b) those who requested a summary report of the research findings. Those who agreed to future participation can elect not to do so at the time of the future contact.

Protection of Participants

The anonymity of participants was protected through the use of self-selected monikers during group sessions. Quantitative risk scores were collated only by code numbers. Transcripts only reflect monikers used during group sessions. The tool forms, demographic information sheets, interview tapes and transcripts were kept in a locked location and will be destroyed ten years after the study completion. The consent forms, demographic sheets and code identifiers were kept separate from the tool forms, tapes and transcriptions. Participant consent forms included an acknowledgement that the tapes and tool results can be subsequently used in a secondary analysis of the data.

University television studio workers signed contracts at the time of employment requiring ethical behavior and assuring the of privacy rights of users of the facility. These contracts are on file with the university. The moderator and researcher have formal schooling in the ethical conduct of research. The video tapes were transcribed only by the researcher. The digitalization of the tapes into a DVD format for use with the N-VIVO software system was only done by the university director of the digital media facility without exposure to student workers.

Potential risks to the participants were not anticipated. Employees of ski resorts did not have their opinions provided to management, except as part of the collated data report. Students did not have their identifiable remarks submitted to any faculty or administrator of their university or school. The opinions and scores of adolescents were not shared with the parents, except in aggregate and collated form. Any future publication or presentation of the data will not identify participants or link statements to individuals with any identifying data.

Review Board Updates

The original research proposal passed ethical clearance by the supervising faculty of the Dissertation Committee prior to submission to the IRB. A PRAF was submitted to the IRB to extend risk tool only data collection when the four focus groups had fewer than anticipated volunteers. Approval was granted in March 2006 for sampling to occur up to the originally planned N = 50 (See Appendix I). This approval also included the addition of Dr Juliana Cartwright as an additional member of the dissertation committee. The original research approval does not extend to any future secondary analysis of the data. Consent forms, however, do cover this potentiality.

Specifics Pertaining to OHSU

The researcher completed the required HIPPA and IRB policy courses prior to submission of the proposal. After successful completion of the proposal defense, the researcher submitted the appropriate paperwork for approval via the electronic web portal of the IRB prior to the collection of any data. Contacts with agencies were not finalized until IRB approval was obtained. Pursuant to OHSU policy, the Dissertation Chair was listed on the IRB forms as the lead investigator and the other members of the

Dissertation Committee were listed as co-investigators. The research idea, work and products are the sole intellectual property of the author.

Specifics Pertaining to PLU

Approval of the OHSU IRB was obtained prior to contact of PLU students for recruitment and conduction of the study sessions on that campus. Dr. Merlin Simpson, member of the Dissertation Committee and Associate Professor of Marketing at PLU, acted as the faculty sponsor for this research and all aspects associated with Human Subjects Review at PLU. Oversight was ceded to OHSU by the PLU Human Subjects Review Board.

CHAPTER FOUR: RESULTS

For brevity of presentation, the sample analysis is presented first to inform the reader of the final sample obtained. The qualitative analysis follows, and then the remaining quantitative section. The insights gained through within-method analysis will be considered using triangulation and across-method comparisons. How the qualitative findings fit within the published literature is integrated throughout, rather than reserved for the final chapter. Chapter Five includes an overall summary of the study by addressing each study aim.

Sample

Demographics

The sample consisted of 50 participants with half completing both arms of the study. The other half finished only the quantitative arm. Sample participants ranged in age from 15 to 28, with nine under age 18 (18%); the mean was 20.3 years (SD = 3.5). Because skiers were purposefully over-selected during focus group recruitment to gain more balanced viewpoints, snowboarders comprised 52% (n = 26) of the group, not the typical two-thirds slope side representation of this age range. Gender mirrored typical winter sport populations with 70% male (n = 35) and 30% female. Neither gender nor age group demonstrated a preference for equipment style.

Eighty-six percent (n = 43) of the sample had over four years of snow sport experience and 48% had over 10 years time on the slopes. Participants typically visited a resort more than four times per year (n = 41), with 44% going more than 10 times per season. Those who had the most experience also participated more often per year (F (2, 47) = 5.37; $p < .01$). Neither the number of times skied per year nor the

years of experience were associated by gender, age group, or education. Those participating the longest preferred skis (F (2, 47) = 7.769; $p < .01$). Age was not associated with years of experience, meaning there were individuals in every age group who were novices and individuals who were very experienced.

The primary recruitment site was a university campus, resulting in 64% (n = 32) of the sample having some college education. Twenty percent were college graduates and 36% were in high school or held a high school diploma (n = 9). Educational level was not associated with equipment preference. Both genders were represented in each educational group.

Reported Injuries and Helmet Use

Prior head injuries were reported by 18% (n = 9) of the group. Males sustained most of the injuries, but this was not statistically significant. Akin to anticipated odds ratios, the longer the number years of participation, the more likelihood a participant was to sustain an injury. Again, this number was not statistically significant. Equipment preference was not associated with head injury.

Helmet wear reflected current trends with 66% of the sample rarely or never using them (62% never; n = 33); 34% wore helmets at least 50% of the time (16% always; n = 8). Wear patterns were bimodal, reflecting a distinct preference to wear them or not. Helmet use did not vary by age, equipment preference, educational group, gender or frequency of participation. Those with the most experience wore helmets more often (F (2, 47) = 5.42; $p < .01$). Prior head injuries were not associated with helmet wear.

QUALITATIVE RESULTS

In mixed methods analysis, data from each arm of the study are separated until the time for comparison of findings. To limit bias when recognizing thematic patterns, the quantitative analysis was not performed until after the qualitative analysis was complete.

Major categorical findings are presented below with key exemplars highlighting the diverse viewpoints revealed during the focus groups. The exemplars represent opinions from a diverse group of respondents with attention to representation by gender, age, equipment style and focus group. Teen sport vernacular is loosely defined after its first usage in the text. This language is retained not only to demonstrate that the findings emerged directly from the conversations, but to also provide an insight into the common vernacular of the group. It is crucial for behavioral interventionists to be familiar with the target population language.

A general flavor of perspectives came to the fore during the analysis phase that differentiated age groups. College students mulled over topics with a sense of relativism. They recognized inconsistencies in statements and discussed various viewpoints. Teens still in high school were rather "black and white" in their answers and worldview. They did not go into depth, but made broad statements of what "is" or answered "because." It was important for them to be seen as capable individuals, but they were less able to articulate a basis for their decision making. Both groups held simultaneously conflicting opinions, but they did not find this to be out of their ordinary frames of reference. Such divergence of opinion is not unusual within adolescent and young adult populations (Arnett, 2000; Gonzalez & Field, 1994).

Those close to age 30 held a more established mindset. They discussed the issues with the others to present their opinion, but were not receptive to possible change. Some had a firm basis for their stance; others referenced a routine or status quo they wished to maintain. These differences across age groups were an expected finding based on developmental norms.

Codes and Categories

Pursuant to descriptive research methods, coding reflected what respondents said and inferences were limited to the easily discernable (Sandowlowski, 2000). Though recruitment was primarily on a college campus, the diversity of opinion was wide ranging. Some informants had polarized viewpoints; others represented more middle ground. Each session unfolded differently, but all proposed questions in the interview guide were addressed in depth. Emerging repetitive themes within and across the groups provided the basis to assume adequacy of saturation of perceptions.

Initial open codes naturally flowed into broader categories. All categories had a link with risk taking. The major categories were: a) Having fun in snow sports; b) perceptions of risk within the sport; c) responses to injury as a potential consequence of risk taking; d) circles of social influence; and e) opinions about helmets. The last category also reflected some revisions of opinion that occurred as a result of focus group proceedings. Because the participants spoke consistently about "living in the moment," the findings below will be reported in the present tense.

Having Fun in Snow Sports

Having "fun" is universally embraced as a major component of having a good day on the slopes. Fun is diffusely defined as being with others and enjoying the natural setting, while experiencing a physical release via a thrilling run down a slope.

It's a Zen Thing

The main attraction in the sport is a "high" that is categorized as "amazing" and unduplicated in other activities. It is a feeling that occurs while skiing very fast. This "high" provides a sense of freedom similar to flying. It is a sense of exhilaration that creates a near transcendent state that banishes both fear and worry. This state shuts out many of the sights and sounds on the slopes. They call it a "Zen thing:"

> Free skiing once you are in the zone it's like you really can't hear anything and you just kinda hear a "whoosh" as you go fast down the hill. After you start, you are totally in your zone and you can hear people and you can see people along the way, but you don't concentrate on that. Like when I ski or board, you just GO! It's kinda like a Zen thing. A free mind. You chill. GO!

One is struck by the apparent inconsistency of verbiage and activity associated with these descriptions of seeking a "Zen-like" state. Zen is typically thought of as the epitome of calmness or tranquility. These informants use pulse-raising behaviors to get there. Their dichotomous remarks reflect what sport psychologists call "flow" or a state where deeply felt reward and inspiration are gained via the physical experience of the moment (Anshel, 2003; Pain & Pain, 2005). Flow cannot be achieved by easy skiing; a challenge, such as speed, must exist. In sports, therefore, it is not considered incongruent to have racing pulses and deep, relaxing satisfaction.

The participants claim the desired "high" is not the media-touted adrenaline rush, but intense physical excitement contributes to it. How the high is attained varies

by individual. Some go "all out," while others get a major thrill taking a tiny bump. One woman is very excited about jumping one inch; another reaches for "SEVERE AIR!" (vertical elevation) in order to achieve thrills. Crossing one's personal threshold is the common factor that creates the thrilling sensation of a "high."

The "high" is a response snow sporters never tire of seeking. Getting to that goal involves some risk:

> I mean I'm wondering why the risk is so addictive. Is it just the rush? It's like a weird feeling and you can't get enough of it per se. It's not like "Well, I've had enough of my fair share of the risk." It's always like we want to go back and get more. I think that's why snowboarders and skiers are their own little family because we get something out of it that a lot of people don't. That's why you want to go back. Some people ski once or twice a year, but if you go up more than that it's to go for that feeling that we can all understand, but can't explain.

Being "Normal"

All informants perceive what they do is "normal" for snow sport enthusiasts. They do not see themselves as standing apart from other skiers. It is "normal" to do tricks (maneuvers beyond routine sliding on the slope) and challenge the mountain and themselves. Therefore, they do not perceive themselves as risk-takers; they are just "normal" or typical snow sporters. These participants do not think of the sport as "risk," but as something that sets them apart from the non-skiing public. This perception reflects that found in other athletes, especially those engaged in risk sports (Ewert, 1994).

Throughout the conversation, these snow sporters frequently refer to a search for maintaining balance and order as they experience "fun." They strive to maintain a sense of being "normal." Being "normal" has two referent aspects. First, normal is considered to be a state that typifies what is usual for them. Second, normal is defined

to be a comparative state with others. It is important to be considered "normal" in both senses. Snow sporters do what naturally comes to mind. They consider themselves normal, because they are doing exactly what everyone else is doing, nothing more.

Such perceptions of diminished risk are typical of adolescents (Gonzalez & Field, 1994). It is reminiscent of the arguments offered by intoxicated college students. If it is typical to witness widespread alcohol abuse at parties, then drunkenness is not considered aberrant behavior. Being drunk is considered neither abnormal, nor risky (Perkins, 1997). They are just having "fun." This echoes the "just having fun" comments of the snow sports enthusiasts of this study.

Perceptions of Risk in the Sport

No one definition or perception of risk is universally held by any group or demographic within the study. Consensus is found in general statements, but the degree of agreement remains diffusely defined as to how risk is viewed in the sport and whether they personally take risks on the slopes. The discussion flits around different ways to think about risk in their sport: a) It is part of the game; b) it motivates them to live life to the fullest; c) it needs to be suppressed; d) "stuff happens;" e) it is something to overcome; and f) it is calculated.

It's Part of the Game

Although the topic of risk taking was emphasized at the time of study recruitment, it is as if there is an unspoken rule among the informants not to readily acknowledge that risk. Risk and risk taking are begrudgingly admitted to be part of the sport, but only a small part. Risk does not define their sport for them; they do not

consciously focus on risk while skiing or boarding. They downplay the impact risk makes on their decision making or their attraction to the sport. Risk is a "given" in the sport, just like snow, ice and the vagaries of the weather. It just "is." Snow sporters expect it to be there and to "just deal with it." Risk taking is simply a "normal" part of snow sports.

Snow sports are not the only risky elements in participant lives. They rock climb, motorcycle, skateboard and engage in other activities similarly considered fast, accident inducing and possibly life threatening. These are sometimes called "way dumber things." Hence, snow sporters perceive what they do on the slopes as not so risky within the context of the rest of their lives. This mirrors the findings of most sports research, where risk takers tend to have multiple venues of risk in their lives (Zuckerman, 1994). This does not mean, however, that individuals take risks in all endeavors (Adams & Hillman, 2001; Rohrmann, 2002; Wilde, 2001).

Snow sports are free flowing in approach, without set routines and only broadly defined rules. Sighting a special jump or undisturbed patch of powder can quickly alter plans made on the chairlift. This unstructured format appeals to those wishing an escape from routine. There is a sense of everything being new and different. The spontaneity plays into potential risk taking for some, because evaluating the consequences of the impulse is not undertaken beforehand:

> When you are playing other sports, you can't have a great idea in the middle of it. Like "Let's make a change and do a jump." I'm playing soccer and let's do a jump? No, doesn't work. "Just do it." You can't just do it! It's just so free with the unstructured nature of it. You can have really hair-brained ideas half way down a hill and do it. There's not anything that you have to hold up to.

Teens are more likely to admit that they approach a run with a "go for it" (vigorously undertake action without thinking first) enthusiasm. The media portrays snow boarders as being radically different and outrageous in action compared to skiers. Equipment choice does not separate the groups on this characteristic in this study; boarders are not more vocal about risk taking or "gnarly" (difficult and challenging) exploits than skiers. Some of most vocal proclamations about exploits come from skiers. This could be linked to the planned over-sampling of this discipline or a group process influence of skiers reactively defending their own standing as equal slope side risk takers in the presence of boarders (Carey & Smith, 1994). These stories of risk taking are incongruently mixed with adamant denials of risk in the sport. These snow sporters start a conversation firmly denying they are risk takers, but then proudly relate a hair-raising event to establish their status within the group.

Living Life to the Fullest

Snow sports help fill a dimension in participant lives called "Living Life to the Fullest." There are physical sensations, emotional highs and personal satisfaction that make the experience far different than the mundane. It makes them feel free and alive in the moment. Describing this concept is difficult for them:

> Kinda like there is no risk. Kinda like you have eliminated the risk like in your mind, and its just like, I don't know, like you are going down the mountain, you know, and you know, like it really doesn't matter; you are going to go off that jump and you really don't think like what kinda injury. All I think like I'm gonna go all out. When I get on the mountain, it's I go all out or I don't go at all. Like I don't go out on the mountain that day if I feel that I am not feeling it, because, because its not any fun to go. Because I do not think its fun to ride the big slopes, you know, and go with the long, easy way down, you know. It's no fun. You have to take risks. So it's a little bit more riskier, but then I guess, I guess I live for that! You know living with the risk knowing that I could not be around tomorrow. Living life to the fullest each day.

Living life is a reflection of the real joy in experiencing things. There is an underlying impetus for experiencing, feeling and doing "more" from the very first chair until closing. Living is a deep feeling akin to the essence of the sport for them. The alternative of sitting home with video games is referenced as a "wasted life."

"Living as if there is no tomorrow" is not considered to be an indicator of fatalism or nihilism. Unlike some references which link adolescent risk taking with despair or resignation toward inevitable loss, there are no references to despondency or rejection of a future in any of these snow sport conversations (Tursz, 2000).

Living life is liberating in the perception of the respondents. Being released from worries and day-to-day routines is rejuvenating. Therefore, going to the slopes is therapeutic and redemptive. As in other invigorating sports, the goal is to get the most out of the day, making the off-slope "normal" easier to face (Cogan & Brown, 1999).

For some snow sporters, being cautious or safe is perceived as having a detrimental impact on living a full life; caution brings risk and reality into focus, which might stifle thrill seeking. Caution would "suck the fun out" and instill fear, leaving an experience not worth partaking. The sport would lose its luster.

Risk and Fear Suppressed

Most participants do not consciously consider risk and fear. It flits in and out of "the back of the mind." Actions are frequently taken without immediate thought of consequence. It is important not to "hold back" when having fun:

> The whole risk aspect of it, I don't think about it that much, but it's something that is in the back of my mind. It kinda pushes me a little bit because like "this could be potentially dangerous," but it's nothing that I do right now that is that dangerous or whatever. When I've never done something before, then that could be risky, but it adds to the thrill of it and the excitement of it! Like breaking new ground. Something I never did before is just part of the fun.

Both genders admit throttling back on some tricks due to risk, but this admission is more frequently voiced by the women. However, all partake of risky maneuvers due to peer pressure. Women worry about being considered "wussy" (cowardly weakling) and sometimes engage in actions to prove themselves to others. Fear rises up and they consciously process the situation, but press on anyway:

> You know that it's a bad idea but you keep going. For me anyway, its when going over a jump. "It's a bad idea! It's a BAD idea. It's a BAD IDEA!" And you keep going and then you hit a plateau and then you are just going! And like it's the best feeling in the world. I don't know if you guys feel this way, but its like, "I'm scared. I'm Scared, I'm SCARED!" And then you just pass through it.

Therefore, these young people live with another inconsistency. Considering risk or its consequences does not stop them from doing what the others do. What their peer group thinks is preeminent. This is an example of the classically defined peer-pressure of adolescence (Gonzalez & Field, 1994; Tursz, 2000). Any consideration of risk is momentary and not restraining. Aborting the attempt of a new trick midway is associated with painful falls; so once committed to the action, they do not restrain their effort:

> I try to stop. Think. Make a decision. And then GO! Like," What are the risks?" I try to think like about that type of thing before doing something that is not usual. Yeah, but once you got that "Go for it!" mentality like you are talking about, it's not GOOD to stop. You really just go for it! Even if you are afraid you just really have to go for it.

This commitment to action is not a "denial of vulnerability"—a characteristic frequently attributed to youthful risk takers (Gonzalez & Field, 1994; Pickett et al., 2002; Tursz, 2000). Rather, there is a modicum of acknowledgment that they can get hurt, but they elect to pursue the activity to gain social status or impress peers. Unless

the perception of risk is very strong, behaviors are not be restrained (Churilla & Baker, 2002; Rolison & Scherman, 2002).

"Stuff Happens"

All participants agree that risk surfaces when least expected, as if fate intervenes. Snow sporters can understand a crash or injury when it is caused by their own actions and they "bite it" (dramatic fall usually involving facial contact with the snow); but they do not understand when falls occur without warning or obvious cause. Rhetorical questions interlace the discussion, such as "What gives?" with continuing surprise as to the antecedents to an accident. Personal actions are least likely to be associated with the fall; the cause is frequently attributed to "stuff happening." Unforeseen forces are the culprit.

This attribution of blame to external entities is an anticipated adolescent finding (Jessor, 1991; Pickett et al., 2002). Developmentally teens are exploring the boundaries of their talents and the limits of their control. Placing blame on external forces absolves the teen from personal accountability. Dismissing external risks as "stuff," precludes a deeper analysis that might reveal a link to personal behavior (W. R. Miller & Rollnick, 2002).

"Stuff happens" during everyday life, too; therefore, the slopes are considered no more dangerous than walking down the street. "Freak accidents happen everywhere:"

> There's risk everywhere though. I guess I don't understand the point of "zoning" your risk, because you take a risk to walk outside everyday. And you are expediting the process, some people will say, if you are speeding down the hill on waxed skis -- two pieces of wood on ice. But, everything you do is a risk (shrugs). So, why not have fun?

"Stuff" might surface due to the variability of conditions. Vagaries of weather and snow conditions are accepted as normal aspects of the sport. Whiteout conditions (visibility reduction where snow and immediate horizon have the same coloration) or nightfall do not dissuade some snow sporters from diving through steep chutes or maintaining high velocity. They proceed because they believe their skill will prevail. In a sense, this can be perceived as evidence of "denial of vulnerability" (Pickett et al., 2002). This researcher, however, believes that it is more strongly associated with over-confidence and an illusion of control, which will be addressed in Chapter Five.

Developmental differences surface when adolescent and adult snow sporters discuss how they deal with "stuff." Teens do not fret about "stuff," but "deal with it" (handle it) as it arises. External forces are not risk factors to them; they are "just there." It is a normal expectation to encounter these situations. Risks are perceived as something extraordinary or not within the typical experience of a day on the slopes. Because "stuff" is expected to occur, many events are not seen as risky. Worrying about probabilities or fate diminishes the fun; it restricts living life to the fullest.

Most college informants meet the challenge of potential risks and "stuff" proactively. They recognize that the odds might catch up with them and plan accordingly. Tursz (2000) would attribute a college student's higher levels of self-esteem to a lower need to takes risks. Some in this age group rely on skills; others express reservations about tackling a challenging situation without extra protection, such as helmets. They caution others to "use your noggin" (think) about sheer ice or attempting the most challenging slopes without the necessary skills. There comes a

time and place to stop. Their comments reflect a stronger internal than external locus of control:

> There is only so much that your body can take, especially if you are not smart skiing. Like if you are skiing by yourself and you are hurt, someone may not find you and you can freeze. So a lot of it is not being smart, or not realizing that your body is hurting, or not realizing that you need to stop. You need to be fully aware of how your body is feeling and how you are reacting to the situation, as well as everybody else and things around you.

Rosenbloom (2003) would concur that this switch to internal motivators helps decrease risk behaviors.

Overcoming Risk — a Personal Achievement

Recognizing risk instills fear in some respondents. This fear then becomes a challenge to overcome. All agree that progress toward a higher skill level cannot occur if fear and caution "holds one back" (restrains actions). Overcoming the fear and playing "on the edge" (the limits of control) tempt fate, but also provides a personal victory:

> The fact that there was risk and you came out of it OK, that builds a lot of confidence. AND not having it. I mean, having the confidence takes away some of the risk as well, because if you get uptight and you are worried about that risk, it just increases it. It just adds to it.

Participants revel in the achievement of learning a new trick. All agree that "you must push yourself" to progress. Even those who prefer not to take major risks work hard at improving their techniques. In an attempt to minimize the odds of failure, some engineering students diagram approaches to jumps, launch angles, speed velocities and bump variations in a graphic representation of the multitude of variables influencing the equation of risk and success. Though failed events are painful due to the injuries sustained, the achievement is not only in learning the trick,

but also in knowing one keeps trying despite the failure. The process is as important as the outcome:

> So you try and irregardless of whether you fail or you complete what they are trying to get you to do, the rush and the fact that you even tried it are worth it.

A Calculated Risk

Throughout the focus group discussions, participants reference "calculated risks." Calculation involves a quick assessment of who they are and the situation they find themselves in. Most recognize they have to master the basics prior to working up to more complex tricks; however, several relate stories of careening down the most challenging slopes on their first days of skiing. Such actions are attributed to youthful indiscretion. Experience and maturity change their approach to the sport.

The caliber of risk is subconsciously calculated. They "just know" it is okay to go. This lowers the perception of risk in snow sports to the same level as other sports, "even golf." Action is taken when it is "safe for me;" however, actions considered safe for one may be risky for another:

> I would say it depends on what kind of skier or snowboarder you are. If you are weaving your way down the mountain just picking your easy way down, I would say it is like golf. BUT, some people are like finding the hardest way down, in the trees, more like challenging, then it's like rock climbing or something, more physically enduring and stuff. So there is [sic]two different sides to it depending on the type of person.

Most participants believe they have and take less risk than others. The degree of perceived risk is modified by prior experience and advanced skill -- the more skill, the less risk. If a calculation is done, such calculation minimizes the risk. This stance is not based on a sense of invulnerability, but on confidence in their own skill set.

These statements reflect the findings of previous researchers with high scoring sensation seeking athletes (Horvath & Zuckerman, 1993; Jonah, 1997; Rosenbloom, 2003; Rossi & Cereatti, 1993; Schrader & Wann, 1999; Slanger & Rudestam, 1997). Young snow sport advocates like other risky sport participants, strongly believe that what constitutes a risky maneuver for others may not be risky for them. This also mirrors the work of Gonzalez and Field (1994) with adolescents. Focus is placed on having control over the factors that might lead to unsuccessful tricks, not on the potential for injury-inducing falls. Thygerson's (1986) work on perception of risk attributes this mindset of decreased risk to participant familiarity with their sport and feelings of control.

Weather and snow conditions are not controllable; thus, skill provides a sense of control over the situation. That control is balanced on a taut edge. This precarious balance between the edge of control and the brink of disaster is exhilarating. Frequently, the degree of control is limited by external factors:

> I like it because you don't have as much control over the elements, like the much more organized sports like baseball, or basketball, or whatever. YOU have to have more control here, because you have to go with the weather and what the mountain has and stuff. It's more in control than you. I like that. I think it adds to the thrill and excitement about it.

The informants acknowledge certain regions of a resort hold more risk. Going out of bounds or "ducking ropes" (violating boundary markers) are universally considered to be risky business. Terrain parks (locations with half-pipes and metal rails to facilitate aerial tricks) are referred to as "injury zones." The backcountry, while highly valued for its isolation, stark natural beauty and untracked powder, is often thought of as "an adventure in uncharted territory." The dangers of avalanche,

potential injury without rescue, and the unmarked hazards of tree wells (entrapping regions at bases of trees) exist there. Only "fools" making "dumb choices" venture into the backcountry alone or without guides:

> It can be a dangerous and risk-taking sport in that sense that you DON'T have control over how much snow there is. Like on the day that I was talking about, that day two people DIED up there on the mountain, because they suffocated from the snow! Experience or no experience, if you get stuck in a tree well, well, you're screwed!!!! You can't get out. AND if you are by yourself! So DEFINITELY, the elements and knowing where you are and not knowing your surroundings can make it like outrageous!

The calculation of risk involves an introspective check on readiness and skill to do a move, as well as an assessment of the environment through which one might travel. If one does not "feel it" (inner security and confidence) on a particular day, they avoid the terrain parks or challenging runs. The vigor of tackling a run changes the degree of risk and alters the calculation. Descriptors like "hucking," "bombing," and "going for it" all involve speed with boundless energy. Though a potential hazard, this speed contributes to the thrill and enjoyment. Hence, a calculation to adjust speed based on skill facilitates the thrill, but keeps the risks in check.

Several snow sporters recognize that their earlier assertions of "not thinking about risks" are incongruent with this line of thinking. Their discussions of "not being smart" and "not thinking" before acting belie the original statements of "just doing it" without forethought. Calculations cannot control "stuff happening." Some participants wrestle with the opposing ideas of dismissing risk and calculating it:

> I guess it's weird that we have all had that same realization, that we really ARE all risk takers. Just looking at that and seeing why I do other things in my life like maybe drive a car too fast, or.....Well, I think its all about the calculated risk. Like if you know that it's there, it decreases it. It [risk] goes away.

These respondents espouse taking risks as not a determinant to having a good day on the snow. Relationships with others may take precedence over doing tricks for a short time. It is acceptable to take a few easy runs or even spend a day with beginners or children from time to time; however, "real" skiers primarily stay higher on the mountain on the more challenging slopes. Otherwise, all the risk and fun are calculated away.

Summary about Perception of Risk

Risks are perceived in two different ways. First, risk is a natural part of the sport both as part of the environment and in the typical activities of a day. Second, risk is something that is consciously undertaken while partaking in the sport. Either way, it is recognized as an integral part of the snow sport experience. Being "on the edge" or pushing the limits of safety is part of the fun. Each individual defines his or her own edge. Doing so allows each person to live life to the fullest in his or her respective way. Typically relegated to a suppressed presence, risk explodes into reality when "stuff happens."

Risk provides degrees of measurement for gauging personal achievement. It can be managed by defining it as situational and controllable within the parameters of "calculated risk." Some rely on the odds; others prepare to meet it head on with thought and skill. Many believe their level of risk is far lower than the rest of the skiing public due to their level of skill. What they do is not extraordinary; they are just "normal" snow sport aficionados. They prefer not be seen as risk takers.

Responses to Probabilities of Injury

When the discussion turns to the possibilities of sustaining an injury while skiing or boarding, all agree that injuries are normally occurring events and are inevitable in perfecting the sport. There is no denial of vulnerability to injury; they acknowledge that progression to a higher skill level involves sustaining some bumps and bruises. The cost of injury is perceived to be less than the benefit. All want to return to the slopes quickly, if they ever get hurt. Disagreements arise when discussing who is at risk, injury-inducing factors, the caliber of injury, and the degree of concern about head injuries.

Risk not Equal for All

A debate exists among participants about who is at greater risk -- beginners or those more experienced. Some believe beginners are more likely to sustain an injury due to inexperience and lack of skill. Others insist low speeds and easy terrain provide protection to novices. All recognize that if people attempt skills and terrain before they are ready, injuries will occur. Most admit that they took risks while beginners due to a lack of self-awareness and a lack of fear. They, therefore, link inexperience with injury. This perception is supported by sports research that finds those with higher skill levels typically have lower injury rates than beginners (Kontos, 2004; Pakkari et al., 2001; Smith et al., 1992)

Key is being aware that one is not ready to progress. Experience and increasing skill help develop a sense of insight and control about where the boundaries of safety and injury-inducing risk lie. Children have no such experience and no innate fear. The participants regard children as more at risk, so helmets are

strongly endorsed for "little kids." The groups could not clarify when that status no longer applied. A college student who stated "age 18" as the demarcation line incurred the withering glances of disagreeing high school teens.

Factors that Induce Injury

Role of Equipment. In the opinion of the study respondents, using new equipment contributes to more accidents and falls. New equipment alters the sense of "normal" by putting one off balance or altering confidence. After a break-in period, the equipment is forgotten until a tumble causes "a boot out" (equipment dislodging fall) or they get "nailed" (being hit) by flying equipment. It is not the equipment, but the change from routine, that sets things in motion. Interestingly, this does not prevent them from adopting new equipment. They understand using new equipment means some injury may occur during the break-in period:

> I think it's because you go outside your own norm. And you are not what you feel comfortable. And when you are not comfortable, then you are not going to be performing at your best level. So, when you are performing at lower than your usual standard, it would be easier to get hurt or to fall, because you are not doing what feels right.

The differences in equipment styles among snow sporters are part of the discussion. Boarders taunt skiers that they do not do things risky enough to "really" get hurt, but believe flying pieces of equipment cause skiers to incur more injuries over all. Skiers believe boarders are more at risk, not due to attitude or amplitude, but because equipment is bound to the feet and do not pop off in a fall, as it does for skiers. Each snow discipline is wary about the "other" discussing risks specific to their domain. Sharp comments abound when comparing equipment-dislodging falls of

skiers or snowboards imprisoning riders in tree wells. Yet, there is empathy for the common experience of injury while learning a new trick for both equipment styles.

Audio Equipment. Snow sporters rely on sensory input to take evasive action and remain safe. Auditory input is touted as a critical element for safety. This need to hear co-exists with a peer culture of fashion dictates and ubiquitous musical accompaniment. Music sources are constantly employed, a hallmark of the echo boomer generation (Alch, 2000; Kroft, 2005). The volume is cranked high, blocking much ambient sound --- the same sound ostensibly relied upon to hear others on the slopes! A discontinuity exists between the need to hear surrounding sounds for safety and the desired music. Snow sporters cannot explain how they resolve these conflicting viewpoints.

Not "Being in the Zone." Skiing and snowboarding are skill sports and paying attention is critical for injury avoidance. Participants agree with sport psychology tenets that concentration, "being in the zone," is somewhat protective of injury (Anshel, 2003):

> I think when you are experienced and you are going fast, you just concentrate about being in the zone and what you are doing and stuff. But when you are kind of just going down an easy trail on the hill, not paying attention to what you are doing, that's when you get lazy and all of a sudden something happens and you are not prepared for it and SWFFT and down you go! Or just making sharp curves, paying attention while you go and, like, what kind of people and bumps and stuff is up there. You can kinda plan for that ahead. But if you are like (waves to others) 'Hey guys and blah, blah,' then you PPFFTT hit it and down you go.

Experienced respondents claim easy slopes are safe for beginners, but cause harm to the informants because they let their guard down. They are not in their

"normal" element on the easy slopes. When they think nothing can happen, it does. Some superstitiously avoid lower grade areas where they have been injured:

> I guess (nervous laugh) I live for the injury! But I, like, don't get injured doing the really tough stuff, the really hard, the extreme. I get injured, like, going off the cat trail (facial expression of what gives?). I mean just getting stuck in the snow, like normal snow! And like I was going down a blue run at the bottom of the mountain and I was like "It can't be that bad of a jump;" and I just go off of it and it ends up almost killing me! So you know, it's on the top of the mountain I just do fine on. The harder stuff and it just sez "Go to the top of the mountain and stay up there." Like you are not gonna get injured up there. You ARE going to get injured on the bottom (laughs). So, don't go down there.

Being "in the zone" requires self-confidence. Self-doubt retards progress toward improving performance and impedes the flow of the "Zen experience." It takes time to re-adjust to the slopes after injury due to self-doubt. This doubt results in more caution, which is perceived to increase risk for another injury:

> At first I will be more cautious. For the first couple of runs, I want to get back on my feet back under me. Being there again. You know, being sure I don't have the same kind of injury and, you know, I end up falling, you know, weirdly, or something that isn't that extreme or risky or that thing. So next time I go skiing, I am just going to go all out, because if I don't go all out, then I get injured!

Other People. The actions of other people on the slopes can get snow sporters hurt. These participants voice awareness that crowded conditions make collisions more likely. In the Circles of Social Influence section below, some of these people are deemed "idiots," because out-of-control resort guests create havoc:

> You might have some stoned, punk kids who coming down the slopes totally unaware and being reckless, and then they slam into your child and they just totally knock his head! There's an inherent danger on the mountain, because you are at risk from other people's stupidity as well. You can't see behind you all of the time.

Other skiers suddenly changing course are sometimes derided for causing problems. Some individuals are so "tuned in" to what they are doing, they totally "tune out" others. Participants strongly believe that being "in the zone" does not negate one's obligation to be aware of one's surroundings:

> You know what is dangerous? It's other people on the mountain. I'm sure everyone here has had the experience where they are going down something and they cross right through you. ....It's the same thing as rear-ending someone on a road. You don't expect what they are going to do. You have to be constantly aware. I mean you are in the zone and you are doing your own thing. You never know if it's a child. They are thinking just like you are. They are in their own world, so you can have a lot of person-to-person contact that everyone has experienced at some time. And that's annoyingly dangerous and it sucks. It also pisses me off.

The discussion about crowding is congruent with epidemiologic findings that collision rates are increasing at resorts (Levy et al., 2002; Xiang et al., 2005). The respondents' solution is to retreat to off-piste sites. They are amenable to this locale shift, because it opens avenues of finding new places to try tricks away from the monitoring of the ski patrol, a group they perceive as sometimes interfering with their "fun." These areas are within tree stands or in the back country, which increase the risk of collisions with trees and contain the larger risks associated with unstable snow conditions, the lack of marked routes and extended rescue times (Bowman & Johe, 2003).

Caliber of Injury

The focus group participants characterize their injuries by the degree of interruption to their day or season and the probability of occurrence. Bruises, "dings" (mild concussions) and even extremity fractures are taken in stride. Respondents believe they know "how to fall." They "play it smart" and only engage in tricks when

conditions are safe. They "don't go flying" (speeding) on ice, only when deep powder can cushion any fall. Most injuries are minor things quickly shaken off. Head injuries are discounted because they are rare:

> But like this whole research study is on risk taking and I think the greater risk is NOT going to be head injury, it's gonna be wrist, elbow or leg injury that is going to be sustained. And I don't see any ways of avoiding those unless you are not just going to push the envelope or not participating in the skiing or snowboarding.

During some of the conversations, flicks of the wrist or dismissive sounds place the potential for injury in a "who cares" or "not worth my time" status. Injury is a "given," so it is not discussed. A previous injury typically does not influence this attitude equally shared by boarders and skiers. It is more commonly voiced by the younger members of the group. Even an injury mid-run causes no more than an interruption:

> I was going off a jump trying to do a back scratcher. My ski caught the back of my head. I have a big cut in the back of my head. Bleeding profusely as head injuries do and you have to finish the run! (Gafaws). You CAN'T JUST STOP!!! You gotta finish the run. There is blood (makes a twirling motion with her finger behind her head) trailing on the snow behind me.

A majority of the participants have no personal experience with a major injury, but have witnessed one. A few did consider additional safety gear, such as helmets, after those events, but most did not follow through. Some consider injury the "cost" of learning a challenging move, recognizing an injury may interrupt their day or end their season. An early season injury may "cost" the entire price of a season ticket, leaving the impression that late season risk taking may be less "costly."

After sustaining an injury, most return to the slopes as quickly as possible; not returning is incomprehensible. "You can't NOT do it!!" All are drawn to return, many times without regard for possible re-injury:

> So you go, like, "I'm gonna take it real easy and take a long time," but you don't. You still ski fast. You STILL push yourself, even though you KNOW your body is not up to the standard. It just is part of the mentality almost, to be seen as risk takers.

Head Injury

Head injury is discounted not only by the percentage of occurrence, but by its intensity. The snow "isn't hard;" "it's like falling into a pillow." Head injuries are "only concussions." Other body parts are recognized to be more likely hurt:

> (Dismissively) I mean I have never really fallen that hard. And when I do, I usually do not hit my head, I usually just land on my side or my back and slide down the mountain about 30 or 40 feet, but I've never really landed on my head. I take jumps, but I usually land on my feet.

A few do seriously consider the potential impact of a head injury. Recovery is not assumed. Some recognize that it only takes one head injury to result in devastating consequences:

> It's not the greatest risk, like breaking your wrist or your arm, but you can still ski and you can still do stuff. I mean even if you lose a leg or an arm, you can still ski. There are guys up there that are quadriplegics or they are skiing up there with one leg. But I've never seen a headless skier or a brain–dead skier. It's just not the same. It's a slim chance. That once.

Interestingly, those speaking of the significance of head injury come from both sides of the helmet debate. Some opponents to wear recognize that there is an inconsistency between what they say and do. They prefer to remain helmet free and risk the injury, even when they understand it only takes "that once." Women who go

without helmets totally discount their own risk, believing they do not do serious enough things to cause a major injury.

Summary of Perceptions of Injury

Like risk taking, the possibility of injury is typically suppressed. Snow sporters recognize that risk opens the door to the possibility of injury, but the odds are discounted, especially for head injury. Injuries are seen as part of the cost of the sport, but the odds of sustaining an injury are not equal for all. The end-of-season injury may "cost less" after the price of a season pass is expended. Equipment, experience and concentration play a role in injury causation. Soft snow cushions their falls, so they believe major injuries are unlikely to occur. Informants are aware other guests can cause injuries, especially if they are out of control. Some have witnessed major mishaps or sustained an injury requiring some time off. Returning post injury introduces a veil of cautiousness, but it is quickly discarded. Most support the proposition that being overcautious is injury inducing. Being injured is a "normal" event on the slopes; eventually, the odds catch up with a participant.

Circles of Social Influence on the Hill

Family, friends and other sport enthusiasts are a lynch pin for why young snow sport participants believe every trip to the resort is worthwhile and some risks are taken. Such social circles provide an impetus for some behaviors, as well as provide both the audience and the subject matter for story telling about hillside exploits. There is universal acceptance by friends and strangers who participate in the sport as part of an extended family.

Family

Biological families are the cradles of the love of the sport. Most informants share deep, affectionate memories of good times on the slopes as a family unit. Families provide role models for skills and behaviors. As children, they scampered to keep up with more skilled family members. They report feeling "a rush" when they finally demonstrate that they can perform on the same level as the older members.

Parents are also a source of tension. Adults have "wagging fingers" about safety equipment and admonitions to "take it easy." Some stories center on parental frustrations with injury rates and respondent refusal to wear helmets. Such frustrations are not limited to snow sport behaviors in most cases:

> I like to take risks all the way around and that's one of things that I do, but the head injuries were like for my parents "OK that's like it. That's enough for us!"....They would take me off their insurance and stuff, so they did.

Some parents are not role models for the use of safety equipment. Participants believe they are justified in rejecting helmet wear if adults do not also use them. When these parents are absent, the students who do not appreciate helmets take the gear off. On the other hand, when participants firmly believe in helmets, the presence or absence of the parent does not impact their wear patterns.

Peers

Friends become the backbone of support as participants grow into their teens, becoming their "family" on the hill. Camaraderie on the slopes is cherished. All are willing to forego exuberant runs just to sit and "make memories" with their group. Many groups trek off to a less populated area, build their own jumps, and enjoy the day isolated from others. No matter the conditions, friends make the day:

> Some of the best days that I've had is when the mountain is like crap so you are just stuck on two runs the whole day, but you just do all the ways to make that run interesting. You are with some people that just make it fun. So, it's a blast.

Fitting into the group structure and expectations hold importance for how the day unfolds. Group members constantly compare themselves to each other and to other groups on the hill. Though one might personally hesitate to do something on their own, being in a group motivates them to engage in tricks and behaviors not otherwise undertaken. This mirrors the literature about peer pressure (Pickett et al., 2002). Participants "push the envelope" because of their friends:

> Your friends are like totally pushing you because THEY have more faith in you than you do. You go like "They know what you can do!" I mean, GOOD FRIENDS (Laughs). Yeah, but if it weren't for a lot of my friends, I wouldn't do the things that I did, but I also would have regretted not doing them.

All, however, claim they hold personal choice in those decisions:

> I mean you know your limits. You know where the break is. Other people are pushing you and you know people can be persuasive and talk you into things. BUT, if you KNOW for SURE that that is something you CAN'T do, then just don't do it. You know, swallow your pride.

These statements demonstrate that most snow sporters recognize competing influences on their behaviors. They may want to be cautious on one hand, but they are also strongly desirous of being accepted by peers. The peer standard is paramount, simultaneously claiming they have both choice and no choice in their actions.

Peers show the way and persistently prod other snow sporters to expand their repertoire of tricks. Sometimes peer experiences are used to gauge the potential risks of a particular maneuver. A determination is made whether to join in:

> My friends are all kinda stupid. I'm not. And it provides entertainment for me I guess. I am not as risky, but I might do it after I see someone else do it. OR

> I'll set up a jump for somebody else. I might try it, maybe not, or something a little less.
> Moderator: So you follow after your stupid friends?
> Eh, maybe a little bit, but not a whole lot. I don't rupture my spleen or anything like that. Its part of the calculated risk thing. You use them to gauge the risks.

Skiers versus Boarders

As in all families, there is a dysfunctional element with a jesting sense of rivalry between snowboarders and skiers. Discussions are interlaced with categorical put-downs and one-up-manship. Pointed comments about the merits of one equipment choice over another are punctuated with expressive body language, good-natured laughter and teasing. The overall tone is akin to sibling rivalry rather than to territorial gangs, hated enemies or disparate factions. However, when discussing issues of how snow sports differ from other sports, skiers and riders are unified in considering themselves different from non-participants.

The most insightful discussion occurs when the issue of control arises. It is generally regarded that snowboarders must work harder to gain and maintain control of their equipment; as such, there is always a sense of imbalance or a potential "wipe-out" (dramatic fall). A participant with experience on both equipment styles describes a balance of control with excitement:

> With skiing is like the control. You just control everything you do when you ski. And when you snowboard, I guess it's more just about excitement. It's a little more exciting to snowboard, I guess. You can do jumps and things. You can get a little more air. You lose more control easier.
> Moderator: So you like the lack of control with snowboarding and the control you have with skiing?
> No, it's more the excitement of snowboarding and the control of skiing. When you just want to go fast, you go skiing. When you just wanna have fun, you snowboard.

Skiing empowers him to exert and perfect control. The more control, the better he is. Luck and external influences are not in control, he is. The excitement of success is more internal and personalized. On the other hand, the loose control of boarding is more freeing and outwardly exciting. He elects which discipline to partake for the day, based on his particular needs for that day. One is defying risk; the other playing is with risk. Skiing brings a sense of asserting control; boarding enables him to directly engage the risk. Both approaches flirt with fate and the perception of narrowly escaping risky odds. This control is illusory (Caffray & Schneider, 2000; LeBreton, 2000).

Social Order on the Slopes

A pecking order of social standing loosely exists on the slopes within the peer group. Personal resolve, emulation of others and prompting by peers provide impetus to move up within that social order. Achievement of status is within everyone's reach, but it must be earned. Sometimes those outside the group help re-define self-perceptions:

> There is always someone who can kick your butt skiing. You will always meet someone who is better than you. And it doesn't matter who you are. I don't believe that there is a best skier in the world or best boarder in the world. There is someone who might go to the Olympics and win, but that doesn't necessarily mean that they are the best. There is just a range. There is [sic] so many variables. You will always meet someone who is better. And so there will always be people to push you and always new things to try with new people.
>
> Yeah, and it doesn't matter how old you are either. I remember I was with my brother and a couple of friends and there was some kid like 5 or 6 who was flying by heading for the trick park. I thought he was going to kill himself and then he does a back flip off a jump and kept going and he was like 6! (Group laughter.) He made us all feel pretty weak. Like we could not do anything.

Being "Kool"

The achievement of being "kool" (fashionable self-possession) is attained through hard work and effort. Fashion sense is important in delineating who is "kool," but designer styles are not as important as having the best gear or "even the best socks!" Snowboarders are more conscious of style. "Kool" skiers are seen as more "REI-ish" in attire (tighter fitting classic outdoor fashion style), while snowboarders are perceived as "zoomies" (avant-garde) or "park rats" (street gang image).

Age does not diminish the importance of fashion sense. Older participants are more confident that they are seen by others as "kool," but they are still attentive to fashion. Though some informants believe a particular uni-color look of coordinated boarding attire is a mark of excellence, such fashion attributes are not reliable indicators:

> To me that would be, like, that Daddy just bought that girl that whole matching outfit! (Waves hands dismissively) Now she is going to take her first run on the mountain and pretends that she is all cool, because she has this outfit and all this matching stuff.

Participants size each other up on the slopes to determine respective levels of status for those within the immediate group or with others outside their sphere. Actions speak louder and hold deeper merit than words or fashion, especially for men. It is very important not to be mistaken for those without status. It is also important not to assert a level of status not actually earned. "Wanna-be's" are looked down upon as individuals who try to act the part but quickly prove that they are not "kool" by their performance and dress. Most are able to spot "pathetic" imposters

quickly. Any evaluation of status typically occurs out of earshot of the intended targets:

> Not like to be mean, like because it's a funny thing like if they don't like know to dress the best they probably are not that good, or know what they're doing. You can TELL that they are really not good just by the way that they hold themselves.

Once again, inconsistent beliefs hold deep meaning for these informants. They adamantly support concepts of individuality and personal choice, but they also speak about the strong social parameters for determining their worth. This is classic adolescent angst and ambivalence (Jessor, 1991; W. R. Miller & Rollnick, 2002).

Beginners

Easily identifiable as a group, beginners are discussed with the sympathetic groans of well-remembered pains and frustrations. Beginners inadvertently cause injuries to others by their unanticipated moves. Generally, they are given quarter for their behavior. Although beginners have lower status, there is no discounting their potential to advance in the standings.

Even after several years of experience, one woman admits that she is still in the beginner "Pizza (snowplow) and French Fry (parallel skis)" stage of ski skill. All are surprised by this apparent lack of progress. Interestingly, she considers herself a risk taker like the others, believing herself to be much more daring than any of her friends, none of whom ski. Though only a beginner in skill, it is important to her to be considered part of the group and to garner respect, because she keeps trying to improve.

Idiots

"Idiots" are out-of-control resort guests who mar the day. They disregard others, upsetting the balance of harmoniously sharing the hill. Though skiers tend to accuse more boarders for these tendencies, both agree that idiots populate each discipline. Doing "crazy" things must be done responsibly and in less frequented places, without risking injury to others. Idiots do not adhere to this code, so they are strongly distained:

> People go up; they think they know what they are doing and then they suck. Then they go and ruin other people's times, because they ruin the grooming on the mountain or like they just go straight. They just go straight and do not know to stop! Then they hurt other people. Not good.

Competition

Though status levels are a reality of their world, all participants strongly believe that there is no true competition among them. Snow sports are viewed as individual events undertaken in groups of friends. Even in recognized team and racing events, the primary focus is on personal bests, not besting another; the time clock is the opponent:

> There's no competition. And any competition there is like with yourself. And I think that's the best thing. In another sport you are against another person. But when you are snowboarding or skiing, you are just going against your best self.

> Well once I did ski team for a long time. And you had to compete, but it's different. It's DIFFERENT. You're not really competing. Even if you ARE competing, its not the same. Its competitive, but not so much. You have ...I don't know...its hard to explain. You have more of a camaraderie between competitors, I think. Because everybody loves it. And everybody loves soccer, but it's different. There it's like I'm gonna win and my team is gonna beat you (making a pounding fist). But here it's a little different. Even if you compete, it's a different sentiment than anything else ...All the teams are like one BIG team.....You pull for each other.

When participants were asked how this non-competitive philosophy fits within the strong status system of evaluating others, they have no definitive answer. They explain that status extends from "what is." Comparison of self to others is not competition. It is not "like in soccer and stuff," where there are defined home and away teams with identified "good and bad guys." Status is individually earned and carried, and derives from an unspoken group consensus. Status has no direct link to actual scores and competitive rankings. The inconsistency of these viewpoints once again highlights how these participants frequently hold two disparate perspectives simultaneously without being disturbed by any incongruities.

Role of Story Telling

Remembering and reliving exploits help to establish and maintain social status in the group. Stories soften the blow of losing a $50 day pass or an expensive season ticket after an injury. They serve as event markers, warnings for the future and reminders of just who they are in their world of snow sports. Stories also help process the events of sustaining an injury:

> Yes, everyone tells stories. Skiers or snowboarders. Whether it is a big wipe out or whatever. There's ranking in your snowboard friends as to who has the best story. Like who has the best wipe out. You compare stories. Battle Scars. It's true. My dumbest like disposal wasn't dumb, but I just tried it. But about a week later I had a cast on my back and down my leg and I had hundreds of kids each day ask how I did it. I'm like (using real cool voice), "Yeah, I was like way up in the air!" You give them the whole story. It gets you some attention! I then feel like I accomplished something. I did something in my life..... I mean even if you don't nail the landing, you still have a story at the end of the day. You come to school with a cast. People are going to start to ask questions. But once you don't walk away from it, the more exciting the stories are. I make more stuff up.

Therefore, stories justify a risky deed and are sometimes embellished. They are used to assert status and impress others. They help provide meaning when injury deprives them of the ability to engage in the sport they love.

Summar of Circles of Influencey

Circles of social influence have great influence on snow sport risk taking. Both positive and negative role models for the use of safety equipment and the degrees of acceptable risk taking impact the decisions of young snow sporters. As in other aspects of a teen's life, peers have the deepest influence. Fitting into the group is important for self-identity, social support and encouragement. Participants modify their attitudes and the intensity of exploits based upon the group norm. Peers provide a measuring stick, as well as impetus, for progressing through ever more complex tricks. Significantly, if risk taking is encouraged, more risks are taken despite personal hesitation.

There is an informal pecking order of "koolness" on the slopes. No one wants to be categorized as an "idiot" or "wanna-be." Though outward expressions of the need to be considered "kool" diminish with age, older participants still want to be recognized as "good." A good-natured rivalry exists between skiers and snowboarders, each group vying for the designation of the most "kool."

Peer proscribed fashion is more an issue for snowboarders, regardless of gender, than skiers. Age does not alter the keen eye of fashion consciousness and dressing to impress others. Skiers and snowboarders appreciate the art of story telling for their "gnarly exploits." There is an understanding that those stories may be

embellished. The stories provide a sense of status, rationalization and justification for outrageous behaviors, and evidence of why the whole experience is worthwhile.

Opinions on Snow Sport Helmets

As the focus group topics move into discussions about safety equipment, especially snow sport helmets, polarized opinions become apparent between those who always wear helmets and those who reject them outright. Some of the most recent adopters of helmet wear are the most vocal in their support. Those against wear are also firmly committed. A few respondents mull over comments from both sides.

In every group, discussions of helmets arise long before the interview plan. These frequent references indicate helmets are on the minds of the participants. In addition to the points made previously, opinions about helmets revolve around the following issues: a) safety; b) a sense of security; c) personal comfort and freedom; d) dealing with another piece of gear; e) image; and f) wear for children.

Safety

Protection from injury appears to be a primary motivation in helmet wear. Informants do not wear helmets only to prevent problems they cause themselves, but to protect themselves from external forces. The out-of-control "idiot" and chair lift are both considered possible risks to contend with, in addition to trees and tree wells.

Protection from Objects. Chair lifts are potential risk zones where a helmet can be beneficial. Beginners are known to "tangle up" (falls involving more than one person) in lift lines. The chair comes from behind and "whomps" (hits them) them on the back of the head. Because teenage lift operators "do not really pay attention," fallen guests are dragged along by the mechanism. Falls from lift chairs also occur

and helmets are believed to decrease the magnitude of those injuries. Some participants admit to deliberately jumping out of chairs when over 30 foot in the air. The motivations for doing so were not pursued, but each claim the helmet "saved them."

Helmets provide protection during collisions with others. All agree that the incidence of impacts with other people is increasing, even without considering the "idiots." This awareness is a key motivator for some participants in their adoption of helmets for protection. Running into another who is wearing a helmet creates a painful bruise. Wearing a helmet is considered required to protect one from another's helmet!

Response to Injuries. A serious injury to a friend or family member sometimes provides the motivation to adopt a helmet. Some speak about "exploding pieces of plastic everywhere" with a reported good outcome, because the helmet took the brunt of a fall. The helmet acquires an aura of protection after one witnesses a spectacular accident. Sometimes friends have a less favorable outcome, providing a sober lesson:

> I HATED my helmet as a kid. I mean, I was a very strong willed child and I still am. I am very bull-headed and very stubborn. Like if you tell me to do something and you nag at me, the less likely I am to do it....But with my helmet, I didn't wear it until one of my friends got into a very bad accident. Unfortunately, I had to learn through my friend and that was probably the best thing for me.

Anti-helmet participants argue that some helmet users still receive concussions from serious falls. The velocity and force of impact overcome any help a "thin piece of plastic" can provide. They are aware manufacturers engineer helmets to protect only for lower velocity falls (Consumer Product Safety Commission, 1999). Participants also correctly cite the statistics that most injuries are not head injuries

(NEISS, 2003). They believe their anti-helmet stance is based on factual consideration and conclude that the cost and discomforts of helmet use are not worth the improbability of need:

> Most of my injuries have been lower back, hip and leg injuries. I've only hit my head, like, twice ...Head's probably the most IMPORTANT, but not the most frequent. That's why we are kinda convinced not to use it.

The pro-helmet group counters that helmets might make a difference. When they weigh the potential consequences, they would rather adjust to any negative aspects of wearing the helmet in order to gain better outcomes:

> But just weigh that factor though. Off for three months maybe or possibly brain damage for life! Obviously your head is the most important thing in your body for life. So if you lose that, you are nothing, you are a vegetable or you are dead. You mind as well be. So you have to think about that. If you do push yourself, yeah, you make that you have a false sense of security, but if you do fall, at least assuming you don't break your neck, your brain is still intact. You save a lot.... It's like carrying an emergency kit in your car. It's just that one time that you are going to need it. I'd rather have it than not have it at all.

Thus, injury probabilities are used by both sides of the helmet debate. The pro-helmet advocates cite the seriousness of neurological trauma, while the anti-helmet group believes the odds of occurrence preclude the necessity for everyone to wear them.

Sense of Security

It is critical to note in the previous quotation references a false sense of security. When asked if wearing a helmet actually compels them to do riskier things, helmet users overwhelmingly answer in the affirmative! They do not hesitate to relate that they are strongly tempted to push themselves a bit further because of the helmet:

> Now it gives me that little voice in my head that says "You are going to be OK doing this, because you are wearing it and you are a little safer; you have

> the extra cushion of protection." ....Yeah that false sense of security to do a double general roll off the cliff. And in reality you really shouldn't be anythere near that cliff, but because you have that on you go, "Oh, nothing will happen to me!"

A comfort zone is entered when wearing a helmet. This zone gives permission to try more complex tricks, because the helmet is there. In the risk literature, risk compensation theorists cite this as evidence that the reduction of risk in one area induces additional risks elsewhere (Adams, 1999; Adams & Hillman, 2001; Wilde & Robertson, 2002). Helmets also boost self confidence. This confidence may be illusory (Caffray & Schneider, 2000).

Frequent helmet users consciously scale back activities when not wearing them. Some snow sporters vary wear patterns by situation. Akin to Curilla and Baker's (2002) work, they voice an added sense of security when in familiar places. If accompanying youngsters playing on easy runs, they "don't need one." Icy slopes, terrain parks, and the backcountry are deemed helmet areas. Some informants are specific about situations where helmets are needed:

> I would say it depends upon the intent and the terrain that I am going to be going on. I'll go, like, sometimes to [name of expert terrain resort] or to [name of resort with many intermediate slopes], something like that. They are two totally different terrains and stuff. And I have a totally different intent when I go up to them. IF we are going to [expert hill], we are going to be jumping all day long and so that's when I wear a helmet. It's not that I feel I can do more stuff, because I'm going to be doing it anyway. It's because it's safer. So why not wear a helmet? It's my why. No, I don't think it gives me a false sense of security or whatever. And when I'm just going to [intermediate hill], I'm not doing anything out of control because I'm just working on regular snowboarding techniques. No big jumps or stuff, so I don't think I need one. I'm not flying down the hill. I'm not going off huge air, so I don't need it.

Full-time helmet users laugh at those who believe they can gauge when or if gear is needed. They declare snow sports are inherently impulsive. "Pulling the

helmet out of your backpack" when one suddenly finds a patch of ice is not a realistic plan. Because "stuff happens," one must always wear the helmet. Use cannot be switched on and off due to unanticipated events.

The anti-helmet segment of the study believes the key difference is confidence in their personal skill set. They believe a piece of equipment cannot boost confidence; one must have confidence to start with:

> Like for me, I feel comfortable going down like even the really steep hills. Right now I feel comfortable enough not to even need a helmet.
> Moderator: Even being the speed demon you are?
> Yeah, I feel comfortable. IF I were doing like real crazy stuff like back flips, then I would wear a helmet. I don't do those.

This stance highlights the issues of control between the two groups. Helmet adopters believe they can control risk by use of the equipment in conjunction with skill. The opposing side downplays the odds of any risk that cannot be controlled by skill.

Personal Comfort and Freedom

While some participants argue that helmets are hot and heavy, many avid users perceive them to be comfortable. Unlike motorcycle helmets, snow sport helmets are lightweight. They do not impact balance. They shield one from the wind and keep one warm. In the rainy Pacific Northwest setting for this study, the plastic keeps them dry.

The anti-helmet participants strongly disagree about any benefits. Several declare helmets are restrictive and confining. They resist the idea of anything on their scalp, not just helmets. Sometimes hats and goggles are also rejected because they involve the head. No one can clearly articulate why this is an issue. It is more a

sensation of having something in their personal space that really bothers them. They plead for understanding of their special needs, as if needing permission for not wearing one:

> Personally, I don't like helmets. I've never liked helmets. I don't wear them when I ride a bike or rollerblading. I never wore a helmet. I don't know, maybe it's just the restrictive feeling (fingers waft to and fro about the sides of his head)....I can't even wear a hat!!! It just bugs me! It's this constant on-the-head thing. I don't know what that is. It is confinement....I mean there are other kids who are "DUH, I don't really care if I wear a helmet or not." I'm just a special case.

Restriction reflects a perception of lost freedom and diminished sensations of being out in nature. These informants believe a "free ride" (without restrictions) is the ultimate experience. A helmet would eliminate feeling the wind in their hair. This sensation of being close to nature is a critical part of experiencing the "Zen-feeling":

> It goes back to that whole sense of freedom and what whole sense of being just out there and going with the flow....You see I would think about that [helmet] and not my run. Instead of not just thinking about it, which I think is just about the best feeling in the world. Just like not thinking about anything and just doing down the mountain. Personally, when I go up to free ride, that's just the feeling that I want. But with that helmet, I would be thinking about the helmet.

The restriction of hearing and peripheral vision resulting from helmet design is also voiced as an objection to use. The side cut of the helmet conceivably limits seeing something peripherally. They claim full head models block some sounds and ear flaps dampen noise. Participants recognize both senses are important to safety.

Interestingly, no one can explain why blocking ambient sound with head phones or musical earbuds is different from any sensory loss from a helmet. Many participants wear both. If wearing earphones causes a fashion faux pas, called a "gapper" (space left between helmet and ear pieces), then fashion sense dictates going

sans helmet, while retaining the audio player. The "need for style" trumps the need for safety! Newer helmets have built-in audio systems. However, no concern is given to auditory loss due to musical input.

This is another inconsistency of ideas related to risk and safety in snow sports. These comments about loss of hearing were made after a spirited discussion of needing to keep aware of "idiots" and others coming from behind. Participants claim they rely on their ears to "hear idiots coming," but fail to link how hearing is modified by audio gear!

Another Piece of Gear

For users, helmets are no different than any other piece of gear they bring to the slopes. They do not perceive the helmet as being any different from the other paraphernalia they bring (i.e., poles, clothing, goggles). It is a natural part of their attire:

> It's like a seat belt thing. I gotta go get my helmet. It's like when you get into a car you automatically get your seatbelt on. I don't even think about it anymore....Like when I went and bought my own stuff, I just bought a helmet, too, just because it's just part of the gear.

Snow sports require a significant haul of equipment from the car to the resort base. One more piece of equipment to lug up to the lodge might be seen as a deterrent, but the fact this item is "carried" by placing it on the head is helpful. Some mention the added protection wearing a helmet gives in the dangerous zone of the parking lot with the closely parked cars and uneven, icy footing.

Recent adopters describe a short transition period when the helmet is not a natural experience. The largest issue is being aware of its physical presence. The way the helmet comes close to the face and covers the ears gives it an aura of being ever-

present. At first, they spend time thinking about the new helmet, which temporarily detracts from their typical "go without thinking" style and upsets their sense of "normal." Within a few trips, however, they do not think about it at all. It is no longer "weird," and the helmet has become natural and normal to be there. One woman purposefully rents a helmet if she has forgotten hers. If she cannot, she does not ski, because "it's that important:"

> It is a weird feeling if you go without it after you have for a while. Like the wind rushes past your head. It's a really weird feeling. It's weird at first when you don't feel the wind, but it becomes weird then when you do. Like you do feel a bit naked.

The anti-helmet participants are less willing to accept another piece of gear. Most reject the thought of wearing the helmet until slopeside. As such, it becomes another item to carry when arms are already overloaded. They do not perceive the mountain to be so inhospitable, or their actions so risky, as to require a helmet. Use is situational or dictated by specific need, such as race team policies or learning a new trick. Always wearing a helmet is an unnecessary burden for them.

Another piece of gear also adds to the expense of the sport. The typical price tag for a helmet is quoted as over $150 for "a decent one." Because most informants are high school and college students, this money is a significant expenditure for a "big hat." The youngest members bemoan the added expense of having to frequently buy a new helmet, because they continue to outgrow previous models. Sometimes these objections disappear when the gear is received as a present, the item goes on sale, or they find a reliable, but cheap, model. This economic objection has been the focus of many bicycle helmet interventions, but typically does not result in much wear pattern difference even with free helmet programs (Britt et al., 1998;

Hendrickson & Becker, 1998; Parkin & Hu, 1995b; D. Thompson, Rivara, & Thompson, 2002).

Image

Image is related to "being kool" and fashion sense. Helmets are accepted or rejected in part by image concerns. The image projected must appeal to fashion, as well as status. Ski team members are required to wear helmets. That team status confers a degree of "koolness" to the helmet. If "dorks" (uncoordinated, social inept persons) are the only non-team users, helmets are rejected.

Interestingly, study participants claim they are not influenced to wear helmets by celebrities, what advertisements declare or their peers. Many are the lone helmeted or un-helmeted member of their skiing group. They claim no pressure to conform on this issue, because they are no longer children. Self-determination is a key value in their decision making parameters. Snow sporters respect each other for the decision to wear or not to wear a helmet. They state that what makes a good choice for one, may not be for another. This attitude crosses gender, age and equipment styles.

Helmets insult the fashion sense of some participants. Amid cries of "it makes me look like a dork," some also rue the impact of "helmet hair." The sweat from exuberant exercise together with the enclosed space of the helmet can produce flat and matted hair called "helmet head." This objection is not limited to the women; several men cite "bad hair" as a barrier to their helmet use. One male claims a helmet cannot fit over his extra large head and prodigious hair. Tying the hair back creates an uncomfortable bump inside the helmet for some. Similar fashion objections form the

basis for significant dissent about helmets in the bicycle community (Robinson, 2003a).

One older woman who rejects helmets vociferously argues loss of freedom when her concern appears to be fashion. Her choice of jacket is an over-the-head model. She cannot conceive of replacing her favorite coordinating hat with a helmet. The helmet would prevent her from putting the jacket over her head. She rejects putting the helmet on last or changing jacket style. She adamantly maintains her right to select her own headgear for fashion reasons and "freedom."

The pro-helmet group perceives the newer helmets as more fashionable than in the past. They note fashion colors and shapes that really appeal to snowboarders. They credit helmet manufacturers for listening to them about the need to be stylish.

Children and Helmets

Some participants wore helmets as children and are comfortable with continuing that use. Most refute claims they do so because they are used to it or do so in other sports. They agree helmet use must appeal to the person, or be their own idea, for acceptance. One participant remembers desperately wanting a helmet as a child, because all the "kool" kids had one. When he had earned enough money, he bought one. With age, being "kool" has been redefined for them. They now "logically" accept the use, maintaining an evaluation of helmet merit as the basis for their continued use, not image. They still relate to the status and merits of being "kool," but subtract their helmets from the equation.

Helmet wear as children is sometimes fraught with later resistance. Participants share a strong rejection of helmets if parents do not use them. They rebel

if the "wagging fingers" about safety imply they are not up to the task of performing certain tricks. They perceive discussions of safety concerns to discount their skill level. One woman immediately accepted the offered helmet as a child because it meant she "had arrived;" her father thought enough about her skills that she now needed one. Thus, the helmet can be a badge of expertise or an emblem of lack of skill. How the helmet is presented greatly influences perceptions of its merit. The path to success comes from providing positive feedback to the adolescent, not a dark picture of possible harm.

Three of the study participants are parents. They struggle with issues of how to deal with their children's needs. No one has a child who has reached the developmental stage of defying parental rules. A mother, who strongly rejects helmet wear for herself, mandates its use for her daughter, "to keep her safe." This parent has many years of helmet-free experience and cannot fathom changing herself. Yet, she cannot articulate what makes the issue different for her child. Another parent who always wears a helmet is adamant about his children not being forced to do so to prevent "instilling fear." Citing slow speeds and beginner status, he believes the helmet to be unnecessary until later when the child is more skilled. He believes the helmet represents parental fear and the child would sense that fear. This fear would impede the child's progress. Though the literature does link parental use to children's wear patterns, no literature was found that explores this "do as I say, not as I do" mentality within a helmet study (Robinson, 2003a).

Following the pattern of inconsistent statements, many adopters and rejecters alike believe there should be a mandate for all children to wear helmets. The age at

which snow sporters gain the ability to reject that mandate is not articulated. The support for required wear stems from memories of their own childhoods with unbridled exuberance and a "terrifying lack of fear." Participants report they did things as children that they would not consider doing now. All would approve of parents enforcing helmet wear for children who do not have "the conscious ability to think through all the processes."

> I don't know. I remember, I was injured a lot more when I was little, mainly because I was so fearless and I didn't understand the consequences....Up to the age of about 18 or until you get injured severely. Being injured is not really an option, but you think you are invincible. I think it teaches. I think we should all wear helmets period. It's definitely a good thing. You can't say it's a bad thing. So if we are teaching them young that it's a cool thing to do, more power to you.

Participants are divided regarding legally mandating wear. Some believe the laws for bike helmets should extend to the slopes; others strongly oppose compulsive helmet use in snow sports for adults. Agreement exists only for mandatory childhood wear.

Summary of Helmet Opinion

Pro-helmet opinion centers on safety, comfort and warmth. Some participants have worn helmets since childhood; others are recent converts. To users, it is ordinary gear. Witnessing another sustain a significant head injury played into some decisions, but most users typically have not had a head injury themselves. They consider wearing a helmet to be a simple, logical decision. All users believe children should wear them.

Anti-helmet sentiment revolves around more varied topics, including fashion, discomfort, outgrowing the helmet, potential hearing and sight problems, cost to

purchase, "helmet hair," impairment of balance and not being "normal." They believe their skill precludes the need to wear one. They reject any need for protection based on the rarity of head injury. Going without a helmet is a conscious decision for many, though they might use them in some situations. Most still favor childhood wear.

The single most important finding is that both users and rejecters believe helmets provide a sense of security. Those who wear them believe they can do riskier things and remain protected; those who typically do not use them espouse the "added protection when learning more difficult moves" position.

Focus Group as Intervention

In this study, focus groups were used to collect data, not as an intervention. Method experts contend that group interaction typically creates meaning for those involved (Morgan, 1996). Hence, the final interview question was an inquiry as to whether opinions had been changed by the discussion. Within every group, some participants responded in the affirmative. College students, more than teens, gave consideration to the decision to wear snow sport helmets as a result of the discussion.

There were two broad areas of insight triggered by participation in the study. The first was personal reflection on their own risk-taking behaviors; the second was a change in perspective about the need for helmets.

Personal Reflection

Several participants are aware of the inconsistency of some of their statements concerning risk and safety. Many voice a newfound understanding of their risk-taking activities. They marvel at a dawning realization that most participants in the group are risk takers:

. I never really thought I was until I took those questionnaires before this. You just don't think about it when you are doing it. Then you sorta look at the questions and, like, "Well, MAYBE!" You sorta have to second guess it. Think about it.

. Some indicate that the conversation helped to clarify what others have already told them about being risk takers:

> I have to be honest. Yeah, I mean I probably wouldn't have [thought of myself as a risk taker] if I hadn't done this. Like if I had not done this study thing. Because we were all filling out the sheets and I was like 'All right that's so me. And now talking about it with the other people. Yeah, I would now say so [that I am a risk taker]. I mean people have always told me I am, but I just never agreed. It's just what I DO. It's just fun.

The discussions open their minds to the possibility of thinking another way. One non-helmet wearer tries to engage the group into a philosophical discussion of the "why" behind their thinking. This is spurred by his recognition that his stance has not been thought out in his own mind:

> Kinda like my other question to the group or the general public is, "Why is wearing a helmet a bad thing?" We all don't like to wear it. So why is that? When we talk about it, we all say," Well, I wouldn't mind wearing it." But we don't. What is it? Why don't we? Is it uncomfortable? Does it look dumb?

Interestingly, his questions go unanswered. The non-users are unwilling, or unable, to respond to his question. No one addresses the "why" behind their deeply held beliefs; no rationale is offered, only statements of "just the way I feel." This underscores the fact that most of the decisions have not been previously considered in depth.

Perspectives on Helmets

These snow sporters tend to have galvanized polar opinions. Those already firmly pro or con do not change their minds during the discussion. No current adopter declares an intent to stop. Some non-wearers are more open to a new way of looking at the issue:

> Like, I probably will consider it, because I've got more opinions. Because this is the first time that I have been around a bunch of other people that pretty much do the same stuff that I do and talked about it. So I've got more insight about why people would choose to wear helmets or why not. So I would probably in the future be more inclined to wear a helmet.

For those considering helmet wear, the two key factors are the potential severity of head injury and the protection afforded from others out of control. They are convinced that head injuries are not a "do over" type of experience. They previously thought of helmets only as self-protection:

> I would say the point that was brought up about protecting yourself from others was the thing that really stuck with me, because before I thought I was protecting myself from myself. You don't really think about how the helmet protects you from the other person flying and hitting you with their board....There's more weight given to the risk of head injury than for the other stuff, because you can recover from them.

These discussions did not alter the stance of all undecided participants. One of the more vocal participants, despite expressing concern about other snow sporters colliding with her, declares a determination to remain without a helmet. She had voiced an interest in adopting a helmet earlier in the discussion:

> With the increased numbers of snowboarders on the mountain, I'm started to be tempted to actually get one. I can't say the number of times that I have been cut-off. I've felt rather endangered by the other people around me....[later in discussion] No, NO, not gonna wear it! I'm careful enough and I use my ears to make sure no one is going to be bombing down behind me. And that's IT.

Another participant wavering about helmet adoption decides against it after finding a different rationalization for why he sustained his last injury. He tried a helmet during his last outing, but altered his skiing style due to the newness of the gear. He was injured again. He keys into the immediate cause of the last accident and rationalizes continued non-use of a helmet:

> I'm still trying to get into the helmet thing. I've been trying to since my last injury. But this discussion did not do it. I'm even less likely to wear the helmet now even feeling this way, because I now know why I got injured last time. I was taking it slow!

One anti-helmet participant explains he would not adopt a helmet, because his prior experience and the discussions of the day reinforce his own belief that he would take additional risks if he donned a helmet. To him, leaving the helmet behind is a safer alternative, because wearing one would give him a false sense of invincibility. He would "give in" to the little voice egging him on to try more challenging tricks.

Summary of Focus Group as Intervention

The focus groups provided insight into risk behaviors and safety issues for several participants. Some moved closer to the idea of helmet adoption. Teens were less likely to consider change than college students. Some found new rationalizations for their actions, which were incorporated into their original anti-helmet stance. Most became aware of personal risk-taking tendencies not previously acknowledged. This gave them pause and has the potential to be interventional in their futures.

Qualitative Results Section Summary

Youthful skiers and snowboarders do not perceive themselves to be risk takers. The lines between having fun and risk taking are blurred. Risk does not define the sport for them. Snow sporters reject the label of risk if it is a common activity associated with a typical day on the slopes. If "everyone else" does it, it is not risky. Snow sporters perceive themselves to be "normal" skiers and snowboarders. Any admitted risk is controlled by skill and calculating the degree of risk by situation, person and environment. Advancing skill decreases any risk that may be incurred by beginners.

Snow sporters believe being cautious and having doubt induces more risk and injury; skiing fast and being "on the edge" of control facilitates progression to higher skill levels with less injury risk. Individuals self-define that edge, but they are strongly influenced by peers. Group norms induce behaviors and levels of risk taking outside personal norms.

Slopeside image and fashion are critical elements for both genders, regardless of age. This tends to be extremely important to snowboarders. For both equipment styles, safety equipment is incorporated into daily wear only if it is compatible with their fashion sense. Fashion infuses the "koolness" peer rating system that defines self and group.

The risk of head injury is discounted not only by frequency of occurrence, but by the probable degree of harm. The issue of potential injury is typically suppressed. Thus, adoption of helmets is not widespread in the sample. Witnessing another sustain an injury motivates some to adopt a helmet, but personal injury does not influence most decisions.

Helmet wear is touted as situational. Typically, it is not deemed necessary on a daily basis, but is useful in more extreme conditions or when learning new tricks. Teens reject most suggestions about wearing helmets for "safety," because this implies doubt in their skill set. Teens may be more receptive to the reverse psychology of requiring helmets as a recognition of their advancing skills.

Helmets can induce additional risk due to an exaggerated sense of confidence and implied protection. Helmets provide a false sense of security for learning more complex tricks. Objections to helmets are predominately based on emotion and

rationalizations. All claim personal choice in these decisions; there is no right or wrong choice.

Inconsistency of Beliefs

The final overall observation is that youthful skiers and snowboarders live with multiple incongruent beliefs. Ambivalence infuses all their discussions. Snow sporters are pulled by competing lines of logic and emotion. All study topics reveal many simultaneously held, but contradictory perceptions and beliefs. These viewpoints are not only voiced by teens; adults also have inconsistent perspectives.

Snow sporters deny the existence of any real risk, yet proudly relate stories of exuberant exploits showcasing such activities. They engage their sport in an environment with rapidly changing weather conditions, irresponsible fellow resort guests and natural dangers, yet they believe they can control risks via "calculations" that diminish their personal odds. At the same time, they subscribe to a philosophy of "stuff happens," demonstrating a cognizance that they have no control over many variables.

Snow sporters have a strong social rating system with harsh condemnation of "dorks," but deny any form of competition between each other on the slopes. They caution each other to "use your noggin" about safety issues, but also challenge each other to "go for it" without regard to potential outcomes. These snow sporters aspire to a "Zen-like" peace and freedom through heart-pounding activities. They are strong advocates for personal choice, yet endorse mandatory helmet wear for teens and children. In the same vein, they override personal norms when group norms differ. Snow sporters claim no influence from peers or celebrities on helmet choice, but

resent poor parental role modeling in this regard. They deny they use helmets for safety, but advocate situational use for added protection when learning new tricks

These qualitative findings echo the literature on adolescent ambivalence, risk-taking, injury causation, and helmet wear patterns in bicycle sports. Importantly, these perceptions are obtained from the youthful snow sports participants themselves. It is not data transferred from other contexts or surmised from anecdotal accounts. There is now a research basis for interventions specific to the sport.

QUANTITATIVE RESULTS

Comparative Sample Analysis

The overview of the sample demographics was presented at the beginning of this chapter. Prior to analyzing the sample as a whole, it was imperative to compare participants recruited for both arms of the study with those completing only the risk tools. The table below outlines the key demographics and risk scores with appropriate statistical measurements undertaken to compare the two groupings of informants.

Table 2

Compare Focus Group and Non Focus Group Informants n = 25 each

	Focus Group	Non Focus Group	Test Statistic
			$\alpha = .05$
Gender	74% male	68% male	χ^2 (1) = .09; p = .76
Boarders	48% (purposive sample)	60% (convenience samp)	χ^2 (1) = 1.28; p = .26
years skied	4-9 years (mode)	4-9 years (mode)	χ^2 (2) = 6.32; p = .11
# of time ski/year	4-10 times/ year (mode)	10+ times/year (mode)	χ^2 (2) = 4.47; p = .04*
# reporting head injury	4	4	χ^2 (1) = .14; p = .71
# never use helmet	21	22	χ^2 (1) = .80; p = .37
education	Some college	HS or HS grad	χ^2 (2) = 7.33; p = .07
	M (mean); SD	M (mean); SD	
Age	M = 20.5; SD = .5	M = 20.9; SD = .5	F (1, 48) 1.55; p = .22
Risk Propensity	M = 34.2; SD = 4.8	M = 34.8; SD = 4.2	F (1,48) .22; p = .64
Risk Aversion	M = 16.3; SD = 4.6	M = 17.1; SD = 4.5	F (1,48) .34; p = .56
Total SS	24; SD = 5.3	21.8; SD = 5.7	F (1,48) 1.89; p = .18

(* means significant finding)

One statistically significant variable differentiated the two groups -- the number of times per year skied. Two factors may have contributed to this difference. First, the focus groups were primarily composed of college students (16 of 25). They verbalized a desire to go to the slopes more often than their studies and finances permitted. Education level had a distinct bearing on the groups. The non-focus group had more high school level individuals (11 of 25) and college graduates (6 of 25) compared to 2 college graduates in the focus groups. The difference in enrolled college student representation would support the earlier statement that the focus group attendees were constrained in the amount of slope-side time they could record.

A second difference involved the timing of the data collection. The focus groups were conducted prior to the ski season and following a particularly abysmal ski year with a 75% decrease in resort attendance. The risk tool only participants were recruited after the focus groups were completed. In contrast to the focus groups, these participants were enjoying one of the best seasons in years. Therefore, it is impossible to gauge any difference between the groups due to these contextual modifiers.

In all other regards, the two groups were comparable. Of key importance were the similarities in all other demographics and risk tool scores. Additionally, the variable "number of times skied per season" did not significantly correlate with any other variable in the study, except length of participation ($r = .33$; $p = .02$). Thus, the decision was made to combine both groups for analysis (N = 50).

Gender Comparison

Males (n = 35) heavily out numbered females (n = 15) in the study, but were proportionally representative of what is expected on the slopes. Many of the findings in the study were gender neutral, meaning men and women did not differ in representation, attitude tendencies or motivations. Table 3 is a side-to-side comparative overview of the sample gender groups. An asterisk signifies the few instances where gender made a statistically significant difference. Discussion of these results is reviewed by each variable.

Table 3:

Comparison of Variables by Gender Total Sample (N = 50)

	Male	Female	Test Statistic $\alpha = .05$
Number	35	15	
Boarders	19/35	6/15	χ^2 (1) = .24; p = .62
# years skied	10+ (mode)	10+ (mode)	χ^2 (2) = .26; p = .88
# of time ski/year	10 + times/ year (mode)	10+ times/year (mode)	χ^2 (2) = .21; p = .90
head injury	7	2	χ^2 (1) = .32; p = .57
# no helmet	23	10	χ^2 (1) = .004; p = .95
education	Some college	Some college	χ^2 (2) = .94; p = .62
	M (mean); SD	M (mean); SD	
Age	M = 20.5; SD = .5	M = 20.9; SD = .5	F (1, 48) 1.55; p = .22
Risk Propensity	M = 35.2; SD = 4.1	M = 32.9; SD = 5.1	F (1,48) 2.62; p = .11
Risk Aversion	M = 15.9; SD = 3.9	M = 18.9; SD = 5.3	F (1,48) 5.28; p = .03*
Total SSS	M = 24.6; SD = 4.8	M =18.6; SD = 5.0	F (1,48) 14.9; p = .00*

Risk Tool Score Analysis

Risk Orientation Questionnaire (ROQ)

The ROQ has two independent subscales within its 12 items, Risk Aversion (Cautiousness) and Risk Propensity. Data analysis was completed using them as separate variables. Chapter Three contains background information on this scale.

Risk Aversion. The possible range for the Risk Aversion subscale (5 items) was 5-35 with a mean of 15. The sample range was 6 to 26 (M = 16.7; SD = 4.55). The sample scores clustered around the scale mean. This was anticipated, because there are expected degrees of being cautious in risky sports, but those who are overly cautious do not typically participate. Importantly, it indicates the sample did not blindly pursue risks without thought; these snow sporters consider their actions.

Chronbach's alpha was .6 for this subscale, meaning it is only a generally useful lens through which to view the subject data for the characteristic of

cautiousness. The reliability data for this tool was unavailable prior to this study. In order to explore whether the degree of cautiousness would provide any useful insight, the risk aversion scores were recoded into two new variables: Low Aversion 6-16 (48% of the sample) and High Aversion to Risk 17-26 (52%). These demarcations were determined by cumulative percentages. Low Aversion scores meant the individual was not cautious in his or her approach to snow sports; High Aversion scores meant the person avoided risky situations and/or took particular care in planning. Both scores were then used in the variable analysis.

Females were significantly more Risk Averse than males (F (1,48) = 5.28; p = .03; See Table 3). This followed expectations in the literature. However, this cautious tendency did not vary with any other demographic, including head injury, equipment preference, age, education, helmet wear, number of times skied per year or length of experience. Women also did not wear helmets more than men. This led to the conclusion that helmet wear was not a sign of being cautious.

All Risk Aversion variables had negative correlations and significant F scores on the Sensation Seeking (SS) subscales, all df = 1,48: Total SS(F = 28.85; p = .00); Thrill and Adventure Seeking (F = 6.14; p = .02); Experience Seeking (F = 13.35); p = .00); Disinhibition (F = 9.03; p = .00); and, Boredom Susceptibility (F = 10.62; p = .00). As anticipated, those with more cautious approaches scored the lowest on the indicators commonly linked to risk taking behaviors. This inverse relationship does not infer that some members of this sample were not risk takers. The sample mean in that regard was above national norms. The inverse relationship means that

the risks undertaken were done with more attention paid to caution and forethought, but risks were taken nevertheless. Being cautious does not preclude risky behavior.

The degree of Risk Aversion played a role in what motivated skiers and snowboarders. Those in the most cautious group scored significantly lower on the RMQ EX (excitement) (F (1,48) = 4.29; p = .04) and IN (inertia) (F (1,48) = 4.91; p = .03) facets. These scores indicate that new and exciting things do not play the same major role in motivating those who are Risk Adverse as in those who score higher on this variable. Other motivators entice them towards risky behavior. As anticipated, cautious individuals stopped and considered activities prior to actions; they were less spontaneous overall.

No other RMQ facet differed when considering Risk Aversion. This means that although less motivated by EX and IN than others in the sample, cautious individuals are not more influenced by other RMQ facets, such as SI (Social Influence) and PS (Prestige Seeking). When taking gender into account, these findings do not change; cautious women are not more influenced by social pressures than cautious men.

It is critical to understand that those who were the most Risk Averse are just as motivated by the experience of the slopes (ES) as those who did not score as being particularly cautious. They are still drawn to the snow sport experience, make the same poor judgments when inexperienced (UE) and enjoy the physical aspects of the sport (PE) in many ways similar to those with less caution. Rather than being deeply motivated by one or two aspects, those who were Risk Averse had multiple influences that induced them to engage in risky behaviors.

Risk Propensity. The possible range of scores for the seven item Risk Propensity subscale was 7- 49 with a mean of 21. The sample range was 22-44 (M = 34.5; SD 4.46). The sample scores were much higher than the scale median. Prior ski research indicated snow sport study participants consistently scored significantly higher than the general population on risk scales, so this skewed finding was anticipated. This knowledge facilitated comparison of this sample with other snow sport studies when addressing risk taking tendencies.

In order to ascertain whether scoring on the scale was linked with demographics and other tool scores, the range of scores were re-grouped into three Degrees of Propensity (not supplied by tool author). Extreme Risk Propensity 36-44 (34%), High Risk Propensity 31-36 (52%), and Moderate Risk Propensity 22-30 (34%) were determined on sample frequencies and percentiles. A low risk group was not devised, because the lowest sample score was higher than the scale mean of 21.

The Degree of Risk Propensity did not vary by demographic. Males scored slightly higher on degree of propensity, but not significantly, denoting that either gender was apt to score high or low on these scales. This pattern of non-significance remained, regardless of the number of times skied per year, number of years skied, education, equipment choice or helmet wear. This finding highlights the fact that demographics within snow sport recreationists aged 15-30 do not easily identify the likely risk takers. Contrary to portrayal in the media, male gender and snowboard equipment choice do not fill the risk taking ranks. It is unknown whether this finding is unique to this sample, reflects its small size, or provides an example of the enculturation difference in those coming of age in the new millennium. Social

commentary frequently alludes to the trend of boys and girls of this generation not being as distinctly different in activities and attitudes, as might have been typical of previous generations (Levine, 2005).

Typically, risk taking behavior peaks in adolescence and trails off through adulthood. In this sample, though the scoring pattern was slightly downward with age, scores remained statistically insignificant between teens and those older than 23. This pattern remained the same for males and females, indicating snow sports participants of both genders remain risk takers longer than population norms. Critically, this is an identical finding as in previous ski research (Zuckerman, 1983; , 1994). The anticipated drop in risk tendency scores did not occur. Hence, the duration of risk taking behaviors was extended. Likewise, the inclusive age range for any intervention program targeting reduction of risk in youth should also be extended. Whether the risk taking scores in snow sport athletes eventually drops toward population means is unknown.

Risk Propensity is correlated with head injury ($r = .29$; $p = .05$). Those having the highest propensity are statistically more likely to report a prior head injury ($F(1,48) = 4,23$; $p = .05$). This follows the typical injury-causation literature patterns. However, this study's finding was gender neutral; both men and women with the highest risk tendencies sustained the most head injuries. The traditional research report of more males than females sustaining head injuries was not supported. Attention to risk propensity characteristics may help refine the understanding of which individuals actually sustain the most head injuries.

Helmet wear was distributed across the range of risk propensity with an upturn in wear rates with the highest risk scores. Considering the higher risk scorers reported more head injuries, this positive pattern of use was initially reassuring. However, self reports of head injuries were not associated with helmet wear patterns. Those reporting an injury did not preferentially use helmets. In other words, the experience of an injury did not instill a reaction to adopt protective gear. The data does not support a conclusion that the helmeted participants were protected from head injury. An uneasy question remains as to whether helmet use by those with more risky tendencies is driven by a motivation to take additional risks with the faulty assumption of head injury protection in all situations.

Not surprisingly, those with the highest Risk Propensity scored lowest on Risk Aversion (F (2,47) = 3.84; p = .03). This was anticipated as these variables are seen as divergent characteristics. Rohrmann (2005), the ROQ author, clearly stated that these are not two points on a continuum, but two distinct variables. It is possible to be a risk taker, but still proceed with caution. This would involve a degree of considered decision making when undertaking risky maneuvers, a tendency repeatedly echoed in the sports literature for those with advanced skill levels. The skill level of this sample was not determined. It can be assumed that the majority of the sample is beyond beginner level based upon the number of years of participation. Almost half (48%) of the sample had more than10 years experience.

The Degree of Risk Propensity should correlate with Sensation Seeking scores according to Rohrmann (2005). The highest risk scorers in this sample scored high on the total SSS (r = .37; p = .01), TAS (r = .37; p = .01) and ES subscales (r = .34; p =

.02). ANOVA scores remained significant in the same pattern, all with $df = 2,27$: (TAS ($F = 5.22$; $p = .01$); ES ($F = 4.98$; $p = .01$) and SSS ($F = 5.44$; $p < .01$). Sample Risk Propensity scores were not correlated with the Disinhibition (DIS) and Boredom Susceptibility (BS) subscales. This mirrored the pattern found in prior studies, where DIS and BS were not associated with non-pathologic behaviors, especially in sports research. A discussion of the DIS and BS patterns is found below in the SSS-V section.

Risk Motivation Questionnaire (RMQ)

Scores from the RMQ were computed into kinds or facets of motivation. Table 4 compares the sample facet scores with the means published by Rohrmann (2002). He did not provide any standard deviation data or go beyond the description of the population as students in several internationally distributed universities. The means were available for each motivation facet group comprising the four subscales of the RMQ. The mean score was an arithmetic average, with 5.0 being the maximum for each facet.

The PA (accident risk) and PS (social risk) subscale values were relevant for this study. Rohrmann supplied evidence of cross-cultural parity in risk estimations, especially for countries of European and UK Commonwealth heritage, such as Germany, Canada and Australia (2002). Data had not been previously released for the USA. Because every item of the PS subscale is reflected in the PA subscale, sample means were not duplicated in the table below. A Chronbach alpha of .87 demonstrated consistency and reliability in scoring patterns.

Table 4

Sample Scores RMQ Facets of Motivation & Published Means N = 50

RMQ Facet	PA Mean	Sample M & SD	Trends
ES experience-seeking	3.4	3.7; SD = 0.68	Injury higher
EX excitement seeking	3.2	3.9; SD = .74	Risk Propensity higher; head injury higher
PE physical sensation	2.6	3.6; SD = 1.0	College higher
PS prestige seeking	2.3	2.6; SD = 1.2	
SI social influence	1.8	2.3; SD = .62	Head injury higher
IN inertia	1.6	3.4; SD = .82	Male gender higher; head injury higher
UE inexperienced	2.3	2.1; SD = .76	
IR irrelevancy	1.2	2.0; SD = .69	Head injury higher

Note: Max mean = 5.0

Compared to the published scale means, the sample scored higher on every facet of motivation except UE (influences associated with being inexperienced). It was evident by visual comparison of these means that Experience Seeking (ES), Excitement (EX), Physical Sensations (PE) and succumbing to the influences of impatience, boredom and time pressures (IN) were major determinants for having fun on the slopes. See Table 4.

The below normal scores for UE (Inexperience) can be explained by the sample having an average experience level of more than four years on the snow. This means the sample did not perceive themselves to be inexperienced or prone to make beginner mistakes. However, snow sports have complex skill sets, requiring multiple seasons of experience to attain true advanced levels. No doubt the participants were attuned to this fact by answering in the affirmative regarding making some decisions from an incomplete experience base.

Motivational facets did not vary based on age, number of years skied, number of visits per year or equipment choice. Males trended toward significance for scoring higher for inertia ($p = .08$), meaning they were more likely to act before thinking. College educated participants scored significantly higher than other groups on the motivating aspects of physical (PE) sensations of the sport (F (2,47) = 5.13; $p = .01$). This finding is consistent with developmental norms for young adults emancipated from parental oversight, but not yet burdened with worldly obligations (Arnett, 2000).

The most revealing variable for facet influence was experiencing a prior head injury. Those who had sustained an injury scored higher on ES (F 1,48) = 4.68; $p = .04$) and EX (F (1,48) = 10.32; $p < .01$) than those never injured. The motivations of experience and excitement seeking are definitely linked with injury causation in the literature. Trends toward significance existed for PE ($p = .07$), IN ($p = .06$) and IR (irrelevancy) ($p = .08$). It is understood that non-significant findings cannot be used to draw conclusions; however, when combined with statistically sound results, the motivations of enjoyment of physical sensations, considering it too much effort to employ safety procedures, and a general disregard for risk potentials forge a link reflective of the larger body of injury and risk literature. These findings did not carry over to helmet wear, with no RMQ motivational facet being linked to helmet use. Therefore, the question about the pattern of higher helmet usage in those with the highest risk tendencies could not be answered using RMQ data.

Those scoring highest on Experience Seeking (ES) also scored high on EX, PS, SI, IN, UE, IR. These scores exhibited significant correlations ranging between .38 to .64 with total risk propensity ($r = .34$; $p = .02$). This threads many facets of

motivation together as contributing to the snow sport experience and risk taking. Not just one area of motivation engenders behavior on the slopes; motivations are highly individualized and integrated. They cannot be teased out for directed interventional consideration without potential loss of full score clarity of the issues.

The PS subscale (measuring the domain of social risk taking) mean was calculated to compare whether the entire group of social facets contributed to any trend or tendency. None of the variables influenced scoring on the PS subscale; however, it approached significance with head injury ($p = .06$). Among the participants reporting prior head injury, higher motivation was gained from Social Influence (SI), Prestige Seeking (PS), and not stopping to think (Inertia). This indicates social influence contributes to sustaining a head injury, but it is not the only cause.

Those who scored highest on the PS Social Subscale also scored higher on EX ($F(2,47) = 36.19$; $p = .03$). Those motivated by excitement in their lives were more receptive to social input as to what adventures they undertook. It follows, therefore, that peer pressure motivates some to take risks and these risks translate into higher injury rates. Although social motivators scored higher in the teenagers of the study, those motivators did not significantly diminish with age; social influences remained high for those older than 18. The influence of peers remained a factor on the slopes beyond the adolescent years.

A higher Degree of Risk Propensity was linked with the RMQ facet of ES ($F(2,47) = 4.056$; $p = .02$). Those most likely to take risks found the sensation of experiencing events to be motivating. Two other RMQ facets, EX and IN, were

significantly influenced by the degree of Risk Aversion. As caution levels rose, the influence of excitement and inertia waned for 48 *df* ($F = 4.29$; $p = .04$ & $F = 4.901$; $p = .03$). Those most cautious tended to steer away from unplanned thrills; however, they still took risks.

Sensation Seeking Scores (SSS-V)

The sample total mean SS score was 22.9 of a maximum possible 40. (See Table 5.) When compared to US norms established in the mid 80's for college students, the sample scores were higher but within 1 SD. The Chronbach alpha score for the SSS-V was .764 for its 40 items, an excellent result for a dichotomous scale (Ray, ND).

Table 5

SSS Norms and Sample Means By Gender n = 50

	Male Norms M; *SD*	Male Sample M ; *SD*	Female Norms M ; *SD*	Female Sample M ; *SD*	Comparison of Gender Means within the Sample α = .05)
Total SSS	23.0; *5.9*	24.6; *4.8*	19.0; *5.7*	18.6; *5.0*	F (1,48) 14.94; $p = .000$*
TAS (Thrill and Adventure Seeking)	7.7; *2.2*	8.9; *1.3*	6.4; *2.7*	7.7; *1.5*	F (1,48) 8.72; $p = .005$*
ES (Experience Seeking)	5.2; *2.4*	6.1; *1.8*	4.8; *2.1*	4.9; *2.3*	F (1,48) 3.96 ; $p = .05$*
DIS (Disinhibition)	6.5; *2.6*	5.6; *2.6*	5.1; *2.3*	3.1; *1.5*	F (1,48) 11.94; $p = .001$*
BS (Boredom Susceptibility)	3.6; *2.1*	3.9; *2.2*	2.6; *2.0*	3.0; *2.2*	F (1,48) 1.78 ; $p = .19$

(* denotes significant finding)

Age group was not a significant variable in the study, meaning scores did not drop over time as anticipated. Higher sensation seeking and risk taking scores were found in prior risky-sport studies, some with extended age groupings (Bouter et al., 1988; Cronin, 1991; Goma I Freiananet, 1991; Malkin & Rabinowitz, 1998; Rossi &

Cereatti, 1993; Schrader & Wann, 1999; Slanger & Rudestam, 1997; Westbury et al., 2001; Zalenski, 1983). Many snow sport participants were risk takers, not just the youthful ones. Therefore, study participant perceptions of risk may be modified by other risk in their lives and the fact they are surrounded by many similarly inclined risk takers on the slopes.

As expected, sample male SSS scores were higher than female scores (F (1, 48) = 14.9; p = .00). This pattern also followed the norms for TAS (F (1, 48) = 8.72; p < .01); ES (F (1, 48) = 3.96; p = .05); and DIS (F (1, 48) = 11.94; p < .01). Males showed more tendencies to seek thrills and excitement, to be on the "wild side" and to go against cultural mores. All these scores were linked to the sample's risk propensity scores. Because risk propensity was gender neutral in this sample, males were more likely to exhibit these risky tendencies using DIS behaviors. They were more likely to demonstrate a "go for it" mindset that startles others and bends the rules.

The college educated participants tended to be more disinhibited (DIS) F (2, 47) = 3.77; p = .03). This could be a function of young adult independence or a reflection of seeking the freedom from day-to-day routines (Cogan & Brown, 1999). Female participants scored lower than the national norms on DIS. This may be linked to the study's recruitment at a church affiliated university. An alternative explanation may be that these score are a reflection of the millennial generation's reputed conservative values (Alch, 2000; Levine, 2005).

The total SS (F (1, 48) = 4.69; p = .04) and BS subscale scores differentiated snowboarders from skiers (F (1, 48) = 9.22; p < .01). These scores identified snowboarders as greater risk takers. Riders were more easily distracted and lost

interest faster than their skiing counterparts. This finding is not associated with gender, age, educational level or prior injuries. Those attracted to boarding are more at risk due to this tendency not to pay attention to details.

Those who had participated longest in either equipment style did not self identify as being bored doing the same sport over and over (F (1, 48) 4.45; p = .04). Those least experienced get bored faster. This is neither a factor of age nor maturity. Those who started very young and have many years of experience did not score differently than those who started in their teens and also have extended time on the slopes. Snow sporters who have not mastered their sport have greater boredom levels. Snowboarders who sustained longevity of participation were significantly less bored than the newer riders. Boredom approached significance for youthful boarders compared to youthful skiers (p = .09). This may explain the difference in injury patterns in previous studies that identified boarders as most at risk on the slopes.

Head injury was not linked to total SS scores, only to the Experience Seeking (ES) subscale. Interestingly, those who wear helmets also scored higher on ES (F (1, 48) = 7.281; p = .01). This means that those seeking more stimulating experiences are more likely to wear helmets. This group appeared to have left behind the stereotypic "wind in the hair"/ "being one with nature" mindset in deference to increasing their repertoire of complex tricks on advanced terrain. When this finding is combined with that of higher degrees of risk propensity being linked with both ES and head injury, it appears adoption of helmets may be undertaken in order to gain a perceived safety advantage for doing the more risky maneuvers on the slopes. The risk-averse participants were not the ones wearing the helmets; it was the risk seekers.

Summary of Key Quantitative Findings

Gender. Many variables and risk tool scores were gender neutral. Gender did not influence duration of sport participation, number of visits per year, equipment preference, helmet wear, education or head injury, though the latter trended toward males. Risk Propensity and motivational facets were also not significantly different, indicating many shared approaches and attractions to the sport for both genders. As expected, males scored higher on Sensation Seeking than females. Men also scored higher on Thrill and Adventure Seeking and Experience Seeking SSS-V subscales.

Risk Aversion. Risk Aversion (cautiousness) was strongest in females, but the women were still willing to take risks. The risks undertaken were done with forethought, but still indulged. The most cautious participants were less motivated by excitement and time pressures than others on the slopes.

Risk Propensity. Risk Propensity (ROQ) did not vary for any demographic except prior head injury; higher propensity translated into higher probability of reporting an injury. Head injury was linked with RMQ motivational facets of ES and EX with trends for significance with PE, IN and IR. When the facets of experience-seeking and excitement were also coupled with higher social influences, head injuries increased.

Equipment Style. The snowboarders scored higher on total SS and the BS subscales, indicating they were more easily distracted and desired more SS experiences than skiers. This finding is gender neutral and does not vary with age. Sensation seeking scores were higher than national norms for both equipment styles, and did not drop with age as is typically expected for either group.

Longevity of Motivations. The motivations to participate in snow sports were deep and enduring over time. Extended duration and frequency of sport participation did not induce boredom. The least experienced snow sporters reported the most boredom. As expected, longevity of participation diminished the degree that inexperience played in inducing actions. Prestige Seeking and Social influence, though higher in teens, did not significantly drop with age.

Head Injury. Higher scores on the PS (social) subscale were associated with more head injuries. Head injuries were linked to efforts to impress others or when trying to keep up with a higher skill group. Those injured also scored higher on the RMQ facets of experience seeking and excitement. Those with the highest risk propensity were more likely to report a prior head injury. This last finding is gender neutral, meaning both men and women who do risky things are likely to sustain a head injury.

Helmet Wear. Stronger SSS-V ES subscale scores influenced helmet wear. Those who claimed higher desires to experience sensations were more likely to wear them. It is proposed that such desires may be satisfied via use of the helmet, because participants attempt more risky tricks while wearing them. Those who have skied longest were also more likely to wear a helmet. This may be a factor of longer-term decision making, exposure to the concept and/or witnessing the accident of another. This wear pattern was not related to the age of the participant, but was a factor of longevity. Helmet use patterns were not associated with gender, education, age, times ski per year, cautiousness or equipment. Reports of head injury were not associated with increased helmet wear.

TRIANGULATION

After completing the analysis of both arms of the study, findings were brought together in order to compare them. The purpose of such triangulation was to seek validation of common threads, identify issues of divergent understanding, and gain a stronger understanding of the topic by viewing the subject through different lenses.

Two tables were organized by study aims using side-by-side comparisons, including a column identifying when findings are divergent. The enumeration of topics within each table has no order of importance. Not every finding is a part of these tables; only those items measured in both study arms were included. Interventional implications, identified as conclusions, came to light by this process. The tables involve Factors for Risk Taking (Table 6) and Factors for Helmet Wear (Table 7).

Factors for Risk Taking

Table 6 Mixed Method Findings on Risk Taking

QUALITATIVE FINDING	QUANTITATIVE FINDING	Divergence
AIM: Factors for Risk-Taking		
1. Hesitant to define selves as risk takers. Consider self as "normal skiers."	Sample scores above national norms for age.	X
2. Teens and college students differ in style of responses, approaches to discussions.	Age is not significant variable for any risk score.	X
3. Participants avoid routine. Seek sense of freedom from fear and worry. Living life to the fullest is major goal.	RMQ facets ES, EX, IN, PE higher than norms.	
4. Women more likely to voice caution.	Risk Aversion higher in women.	
5. Women do not want to be "wussy."	Risk Propensity is gender neutral. Aversion and propensity are independent measures.	
6. Group norms supersede personal norms. "Koolness" and social prestige important.	Social subscale scores are higher than norms	
7. Cautiousness and self-doubt yield injury.	Risk aversion not linked with head injury. Study did not address other injuries or self-doubt	X
8. Individuals self-define their own motivators.	RMQ scale shows wide diversity of answers	
9. Stuff Happens.	Inertia and Irrelevancy scores are higher than norms.	
10. Advocates of both equipment styles insist they approach their sport with the same vigor, enthusiasm and skillfulness.	Snowboarders score higher than skiers on total SS score and boredom susceptibility (BS) of the SSS-V.	X
11. Participants believe what would be risky for others is not risky for themselves due to their experience and skill.	Inexperience impacts the sample's risk-taking less than norms.	
12. Debate whether beginners or the most advanced are at most risk for injury.	Those with less experience also score higher on boredom susceptibility.	X

Risk Taking Consistencies

Gender. The study's women voiced and scored higher on issues of safety and caution. They were more likely to think before acting. Importantly, they also scored high on taking risks and contributed equally to conversations about risk taking. These are not contradictory findings, because situational tendencies toward risk aversion and risk propensity are two independent variables, not a continuum of one variable (Rohrmann, 2002). It is possible to score high or low on both measures at the same time. The women were more cautious, but still proceeded with risk taking behaviors. Conclusion: Interventions addressing the needs for safety may have a more receptive audience with women; however, females must be recognized as risk takers, just like men.

Age. All sample sensation seeking scores were above national norms and did not drop with age. Risk attitude scores were gender neutral. As such, risk-taking individuals cannot be easily identified by demographics. Slope side time and experience may foster additional "calculation of risks," but risk-taking motivations and behaviors did not change over time. Participants uniformly avoided routine by using excitement and experience seeking activities to live life to the fullest. Conclusion: Interventions must recognize that there are no "low risk propensity" participants and snow sporters of all ages desire to "have fun" through potentially risky activities.

Social Influences. Social influences were strong motivators for snow sport enthusiasts and did not appreciably drop with age. Group norms superseded personal norms. Issues of fashion and style, together with the enjoyment of music,

overshadowed concerns about safety. There were keen concerns about status and being "kool" that carried both a personal and group reference. However, these social influences were balanced with a strong sense of individual choice. The strong personal choice influence was evident from the wide mix of motivators influencing slope-side decision making and fun. Conclusion: Interventions cannot appeal only to group norms without addressing personalized concerns as well.

Vulnerability. The emphasis on individuality led participants to believe that activities deemed risky for others were not risky for them. They believed their skills diminished the risks on an individual level. These snow sport enthusiasts accepted the possibility of injury stemming from their own actions, as well as external forces (Stuff Happens). Each viewpoint recognized the role of impatience (IN) and a feeling that the odds will eventually overtake them (IR). Conclusion: Interventions must recognize that snow sporters do not deny vulnerability to injury, but believe their skills are protective.

Risk Taking Divergent Findings

Five areas in Table 6 (items 1, 2, 7, 10 and 12) have divergent findings. These contrasts enable the researcher to search for meaning not readily apparent on face value. These deeper understandings are critical planning pointers for any future intervention.

Item 1. This sample was hesitant to define themselves as risk takers, yet they scored above national norms for their age on risk taking tendencies and motivations. This divergence highlights the strengths of gaining data through two different research methods (Tashakkori & Teddlie, 2003). A critical element to understanding

the risk taking behaviors observed on the slopes, or to plan a successful intervention, may hinge on this crucial point -- snow sporters do not perceive themselves to be risk takers, yet all risk tool data indicates they are.

Interventions must start with the understanding that the target population may not believe they have a problem. Young snow sport participants were convinced they were only doing "normal" things and having "fun." They also resented being considered less than a skilled athlete. If the program assumed the participants were self-aware of their tendencies to take risks, it can prematurely address how to curb risk taking behaviors, leaving the audience wondering if the session had any personal relevance (W. R. Miller, 2004). Conclusion: Risk taking tendencies must be addressed in a manner that also considers the self-identity many of the participants hold as skillful athlete (who happens to have some risks with which to contend).

Item 2. Quantitative findings did not reveal any trends that keyed upon age differences among participants, yielding a greater window of both opportunity and need for intervention with snow sports enthusiasts. The qualitative analysis, however, revealed a response pattern variation between teens and college students. The teens were polar in their opinions and tended to focus perceptions within an emotional framework. College students were more relativistic in responses and open to change. Without this qualitative input, the stability of scores across all age groups could be misinterpreted as a "prolonged adolescence" for how skiers and boarders interact with situations on the slopes. Conclusion: Potential interventions should be tailored differently for each age group, despite recognition of the prolonged risk-taking pattern of the participants.

Item 7. Focus group participants strongly believed cautiousness increased the risk of injury. The risk attitude data demonstrated there was no link between Risk Aversion (cautiousness) and head injury. This study did not address other forms of injury, nor did it measure self-doubt. The low power of the study may be the reason for not finding a link between these variables; however, participant misperception may be the reason behind the incongruence.

The key to an intervention for this item is drawn from another qualitative finding dealing with "normalcy." It was not cautiousness per se that instilled risk, but being outside typical personal patterns. Hesitancy should be recognized as having an incomplete skill set for a particular trick. Conclusion: Suggesting gradual adoption of new tricks would provide an avenue toward faster re-establishment of normalcy.

Item 10. Skiers and snowboarders scored differently on risk taking tools, even though their banter back and forth in the focus groups implied parity of activities. As mentioned earlier, the skiers may have reacted to the taunts of snowboarders and boasted of exploits not in keeping with their actual behaviors. The stronger tendency toward boredom susceptibility in boarders was congruent with their higher sensation seeking scores. An observation by a participant who both skis and rides distinguished the different approaches to risk taking. Skiers believed they controlled risks up to a tautly honed edge; snowboarders played with the risk just over the edge of loosing control. Conclusion: Interventions need to address risk taking differently for each equipment style based on approaches toward control.

Item 12. The debate of whether beginners or more advanced participants had a higher injury risk was not the focus of this study. Those who had more experience

and skied longest were more likely to have reported a head injury. The timing and history of those injuries were not recorded. They may have been recent or occurred long ago. The study also only addressed head injuries. Of key importance was the observation that those with the least experience were more susceptible to boredom. Conclusion: Intervention sessions must be shortened or topics switched with greater tempo, when delivered to novice snow sport enthusiasts. It is also important to focus on being aware of self, others and the environment at all times.

Factors Relating to Helmet Wear

Comparisons of findings from both arms of the study were congruent with each other for snow sport helmet wear (Table 7). The participants were generally polarized in viewpoints either for or against wear. The two study arms did not reveal divergence.

Table 7

Mixed Method Findings on Helmet Wear

QUALITATIVE FINDING	QUANTITATIVE FINDING
1. Head injury discounted by % and intensity.	Head injury reported in low numbers.
2. Role models can influence helmet wear patterns, but not consistently. Decision not determined by peer group, but by self.	Wear patterns match population observations. 100% answered they were happy with current wear status.
3. Image and fashion trump safety decisions.	Social subscale above norms.
4. Injury seen as "part of the cost" of the sport.	Head injury linked with Risk Propensity and the motivators of of ES and EX.
5. Witnessing accidents motivates helmet adoption.	Tracking of motivators to wear not done. Longevity of participation with increased use may be linked to this factor.
6. Personal injury not linked to wear.	Injury reports not linked to wear.
7. Helmet opinions polarized.	Distinct pattern of use or non-use.
8. Helmets allow and may induce more risk taking.	Experience Seeking is higher motivator in helmet users.
9. Adoption not done only for safety or cautiousness.	Wear is not linked to Risk Aversion.

Snow sport helmets were not solely worn for safety inasmuch as Risk Aversion was not linked with helmet use. Focus discussions revealed the highest risk seekers frequently adopted helmets in order to expand their repertoire of tricks. Experience Seeking was a high motivator in this group. Hence, pushing the boundaries of experience was facilitated by the use of helmets. Interventions must highlight that helmets are not a panacea for ensuring safety. There are limits to the degree of protection provided by the helmet. Risk taking will occur, but emphasis must be placed on informed risk taking and that all risk cannot be "calculated" away.

Though the injury of another may influence the helmet wear decision process, personal injury was not linked with wear patterns. Interventions should take

advantage of the tendency to learn from the mistakes of others, but must also overcome any perception that it can "only happen to the other guy." Head injuries were reported by both genders. Thus, interventions should not target only male participants, because the motivators and tendencies toward risk and injury are present in both genders. Recruiting peer role models in helmet wear, especially in those who hold a "koolness" status, might be influential in gaining ground within a peer group.

Validation for Use of Triangulation

The majority of findings were consistent between both arms of the study. This confirmed that what the participants related in the focus groups was congruent with the way they responded to the objective risk attitude scales. This provided great credence to the perspectives and viewpoints provided in the focus groups. It underscored the truthfulness of the findings. A review of divergent findings supplemented the depth of understanding. What was uncovered by using mixed methods would have been missed had only one approach been used. Rather than providing contradictory information, the divergent findings enabled the reader to step back and see the issue with greater clarity when moving forward in the clinical application of the findings. Therefore, specifics garnered in this study can be used more confidently as the basis for future survey and intervention development.

CHAPTER FIVE: DISCUSSION

This chapter opens with a summary of findings presented as responses to the aims and research questions of the study. A discussion of the study's limitations follows, including plausibility and limitations of transferability. The next section on significance details the study findings in light of the core conceptual framework of ambivalence. It contains detailed discussions of the issues of control, vulnerability and snow sport helmet wear with the intent of providing evidence of application of the theory. The final section on Next Steps includes questions for future research and recommendations for incorporating the findings into health promotion programs and health policy.

STUDY SUMMARY

A greater understanding of youthful snow sport recreationists and their sometimes conflicting attitudes toward their sport was gained by this study. Using mixed methods, the perception of risk taking in snow sports among participants age 15-30 was explored with an interest in whether risk was associated with helmet wear. This summary is extracted from the triangulated findings of both arms of the study.

Addressed at the level of an initial exploratory study, threes aims guided the project: a) to examine perceptions of risk and risk taking among snow-sport recreational level participants ages 15-30; b) gain insight as to whether those attitudes are associated with helmet wear; and, c) gather data as to whether adoption of snow sport helmets contributes to a tendency toward higher levels of risk taking on the slopes. Three research questions helped answer the first aim: a) Do youthful snow sport participants believe they are risk takers; b) what aspects of their sport are

perceived to potentially hold risk; and, c) what motivates them to take risks? The second and third aims were explored through the fourth of question -- How do participants respond to suggestions to wear helmets? An overview of the study is best accomplished by answering those guiding questions.

Do Youthful Snow Sport Participants Believe They Are Risk Takers?

Snow sporters denied they were risk takers. They perceived the activities and behaviors they exhibit on the slopes to be reflective of the heart and soul of the snow sport experience. They were "normal" winter resort guests who did not seek risks, but only attempted to have "fun." As a generational group representing the echo boomers, they perceived themselves as respectful of others and the rules. They did not match the media portrait of anti-authority and defiant individuals. Though their risk attitude scores were higher than international norms, they did not accept the descriptor of risk taker.

Snow sporters recognized that some may categorize their sport as risky; however, they did not perceive what may be risky for others to be risky for themselves. They approached their sport with a willingness to repeatedly attempt new tricks, because they believed their innate skills enabled them to do so. Taking their cues from encouraging peers, snow sporters persistently improved their mastery by pushing the limits of performance despite some initial hesitancy. They did not engage in activities with risk taking as their motivation. They celebrated the attempt to accomplish a task with as much vigor as the actual attainment of a new level of expertise. Because this was accomplished incrementally, it was not considered risk taking, but a natural progression in their sport.

What Aspects of Their Sport Are Perceived to Potentially Hold Risk?

Risk was understood to permeate every aspect of their lives. Snow sporters did not perceive the mountain to be inhospitable or to hold more risk than any other aspect of their lives. A winter resort typically was informally partitioned into sections that they perceived may hold differing risk potentials, including the back country, terrain parks and the most expert chutes. However, any risk associated with activities in these regions was perceived to be mitigated by having an appropriate skill set to handle the situation.

Snow sporters recognized risk taking opened the door to the probability of injury, but those odds were discounted, especially for head injury. Injuries were seen as a part of the cost of the sport; the odds of sustaining an injury were not deemed to be equal for all. Beginners were considered more at risk due to inexperience. Children, regardless of skill, were also considered at risk, because this age group did not think through their actions. Equipment, experience and concentration were seen as playing a role in injury causation. Soft snow cushioned their falls, so they believed major injuries were unlikely to occur. Most snow sporters supported the proposition that being overcautious was injury inducing. Informants were cognizant that out-of-control guests can cause injuries. Another's helmet was cited as potentially causing injury during a collision.

What Motivates Them to Take Risks?

Many people influenced the attitudes and experiences of youthful snowboarders and skiers, providing both positive and negative role models for the use

of safety equipment and in the degrees of acceptable risk taking. During the teen years, peers exerted the primary influence on behavior. Participants modified their attitudes and intensity of exploits based on the group norm. Significantly, if risk taking was emphasized, then more risks were undertaken than the participant naturally felt comfortable in engaging. Group norms superseded personal norms.

Snow sporters scored high as sensation seekers with a significant degree of risk propensity. They craved excitement, enjoyed the physical aspects of their activities and reveled in the process of achieving a new level of skill. Though status played a role in self-identity and self-worth, snow sporters did not believe there was any competition with each other. They enjoyed watching others perform and celebrated when peers attained desired outcomes. They used speed and daring exploits to seek both a physical and emotional high that was perceived to be simultaneously relaxing and invigorating.

Men and women were both motivated to pursue thrill seeking and exciting runs. Women were more likely to consider their actions before engaging in an activity; however, they overcame any initial doubts and joined their peers in vigorous pursuit of "fun." This pursuit was not fueled by feelings of invincibility or undue "optimistic bias."

Skiers were typically motivated by a sense of maintaining control and achieving mastery of their skill set. Snowboarders were more apt to defy the edge of control, riding fast and barely averting a fall. They scored higher than skiers on Sensation Seeking. Significantly, neither group perceived their control to be illusory;

rather, they firmly believed their skill and calculation of risks enabled them to challenge any environmental hazard found at a snow venue.

Snow sporters with the most experience scored the lowest on boredom susceptibility, demonstrating longevity in the sport did not diminish the underlying motivations that kept the participants returning time after time. Novice snowboarders scored higher on boredom susceptibility. This boredom may account for the higher injury rates found in snowboarders compared to skiers in most epidemiological studies.

How Do Participants Respond to Suggestions to Wear Helmets?

Pro-helmet opinion centered on safety, comfort and warmth. To users, helmets were just a piece of ordinary gear. Witnessing another sustain a significant head injury played into some wear decisions, but most users typically had not had a head injury themselves. They considered wearing a helmet to be a simple, logical decision. All users believed children should wear them and voiced disapproval if parents did not role model helmet use.

Anti-helmet sentiment centered around varied topics, including fashion issues, discomfort, outgrowing it, potential hearing and sight problems, cost to purchase, "helmet hair," impairment of balance and not being "normal." Non-helmet wearers preferred to rely on their skill than a sense of protection offered by the helmet. Rejection was associated with a perception that head injury was rare. Many still favored childhood wear, while opposed to enforcement of wear for themselves.

The single most important finding was that both users and rejecters believe helmets provide a sense of security. Snow sporters with the highest risk attitude

scores were the participants most likely to use helmets. Those who wore them believed they could do riskier things and remain protected. Those who typically did not use them, partook of the "added protection" intermittently when learning more difficult moves.

Limitations of the Study Analysis

The use of mixed methods facilitated consideration of the research questions from multiple angles and enhanced the findings. However, there were limiting factors including the small sample size, with the resultant limits on power, and issues of convenience sampling (see Chapter Three and Four). By design, topics were not discussed in depth. Focus group statements were not individually evaluated for a linkage to risk scores. Factors were not controlled, such as skill level and experience. The Next Steps section will outline other questions this study leaves unanswered.

Rather than consider these limitations as shortcomings, they are also presented as anticipated outcomes associated with an initial exploratory study. Two statistical findings need to be discussed to prevent the reader from drawing unintentional inferences.

Limitations: Head Injury Reports

The trend in recent research literature indicates evidence of a higher risk for head injury in snowboarders compared to skiers (Dohjima et al., 2001; Machold et al., 2000; MacKenzie, 2000; J. Shealy et al., 1997). This study does not support those findings; however, the parity in self-reported head injury between the skiers and boarders of this study was offset by two major considerations. First, the intentional over selection of skiers for the focus groups skewed the representation in the sample

away from the typical skier-to-snow boarder ratio found on the slopes for this age group. Second, the study relied on self-report for head injury occurrence. Such evidence is always deemed highly suspect and unreliable by any standard. Thus, head injury rates cannot be extrapolated from this study to demonstrate a reversal of reported injury rates since 1997, which placed snow boarders at higher risk.

Similarly, the fact that longevity in sport participation was linked with a higher report rate of head injury in this study cannot be cited as running counter to sports research that established that injury rates for those who are expert are less than those who are beginners (Bouter et al., 1988; Goulet et al., 1999; Kontos, 2004; O'Neill & McGlone, 1999; Pakkari et al., 2001; Smith et al., 1992). The statistics reported here are lifetime episodes, not injury rates associated with precise levels of expertise. Longevity should not be assumed to be evidence of proficiency in skill. Years of experience should expand the skill set, but this should not be assumed. This study did not request information concerning reports of sport expertise or when the injury occurred during their skiing histories. Therefore, there is no basis to assume that the higher reports of head injury in those who have participated longest in their sport are related to a higher skill set.

Inconsistencies in Perceptions

During the initial analysis, it appeared that multiple perspectives existed and that a saturation of findings was not achieved within the original sample size recruited for the focus groups. Almost every person provided inconsistent statements to some degree. The delivery and demeanor of the participants demonstrated that they did not perceive their statements to be contradictory. They lived daily with multiple,

simultaneous perceptions and values that were not compatible with each other (see Table 8). The study's conceptual framework of ambivalence provided strong evidence that such inconsistency should have been anticipated based on adolescent norms and the expected pattern of competing influences in any individual contemplating a behavioral change (W. R. Miller, 2004; Proschaska et al., 1997). A pattern of repeated, similar inconsistencies arose, lending support to the decision that adequacy of divergence of opinion had been achieved to answer the basic questions and fulfill the intent of an exploratory study.

Transferability

This report has provided repeated instances where the study findings were consistent with the foundational literature drawn from multiple fields of study. These congruent findings suggest that the study holds credibility and trustworthiness for potential application in programs for youthful skiers and snowboarders. In qualitative and mixed methods studies, it is the reader who must determine whether the findings are transferable (Morse, 1991, , 2003).

Readers must consider the use of these findings within the four kinds of transferability: ecological, population, temporal and operational (Tashakkori & Teddlie, 2003). Ecological transferability alludes to contexts not covered in the settings and specifications of the research. Population transferability covers application to other individuals or groups. Temporal transferability deals with issues of time, history and events within considerations of timeliness and perishability of findings. Operational transferability considers whether similar inferences can be made when using methods not included in the study. Rich, thick descriptions have been

provided, along with a detailed data analysis, in order to facilitate the decision making of the reader (Creswell, Plano-Clark, Gutmann, & Hanson, 2003; Morse, 2003). Each type of transference is discussed below with suggestions and cautions offered for consideration.

Ecological and Population Transferability

Ecological and population transferability are intertwined in sports, sports psychology and injury prevention research. Because these fields involve people, the places and situations within which the events or processes occur are not easily dissected from each other (Anshel, 2003). This study was limited to youthful recreational level skiers and snowboarders at designated winter sports resorts. It would not be advisable, therefore, to transfer these findings to situations outside designated winter resort boundaries. Geographical divisions of the resort were tangentially addressed, but further study needs to determine whether there is merit to believe that those who limit activities to terrain parks, the back country, novice training zones or the most expert runs, have variant responses.

This study targeted recreational snow sporters aged 15 to 30. Extension to other demographic categories or individuals enrolled in organized ski teams or possessing expert or professional skill levels is not suggested. Although the risk taking scores of all snow sporters were high, and remain so longer than typical population trends, no data exists as to how the scores taper over time or whether developmental and generational norms will alter perceptions and actions of other individuals. Future studies about risk perception and helmet wear are needed for

children, pre-teens, middle aged, and senior snow sport enthusiasts. Follow up studies that segregate teens and young adults are also required.

Temporal Transferability

Some of the findings of this study were potentially impacted by a window of temporal transferability. In the past few years, there has been an upward shift in the percentage of helmet adoption on the slopes. According to the Theory of Diffusion, the stages of innovation and early adoption are shifting into more main stream acceptance patterns (Anderson et al., 2004; Rodgers, 1996). With this growing acceptance pattern, the barriers to wear identified in this study may become less critical, while new objections may emerge. The time is ripe for interventional programs to facilitate the speed of the adoption trend.

The passage of time will bring more echo boomers onto the slopes. As these individuals mature, they may shrug off the externally-imposed descriptions of their core characteristics and define themselves more accurately. Current comparative statements of how they differ from previous generations may prove to be accurate or only transitory. It is doubtful that significant shifts of understanding will occur in the next decade to alter the suggested interventional approaches presented in this narrative.

The reader may question the timing of the results within a contextual influence of the 2006 Olympics. The focus groups occurred three months prior to the games; those completing only the risk tools did so six weeks after the games concluded. Although two Team USA members trained at the resort most frequented by the participants, it is doubtful that the events of the Olympiad significantly

influenced the results. This conclusion was reinforced by participant comments indicating minimal celebrity and media influence on their selection of fashion and slope side activities.

Operational Transferability

Interventional programs form the next logical application of the findings. Although future research can lend additional insights, the critical observation that helmet objections and motivations are similar between bicycle and snow sport contexts (see section below on interventions) provides a basis for learning from bicycle program histories of what was successful and what appeared to have no effect. It is understood that bicycling occurs in a different environment and is a mechanized sport; however, the target population of youthful participants come from a common background of peer reference and fashion consciousness. Bicycle findings and this study provide the baseline of information to use until further research develops which may highlight distinctive differences between the two groups.

SIGNIFICANCE and APPLICATION of THEORY

The impetus underlying this study was a motivation to influence reduction of neurological trauma on the ski slopes. The finest traditions of the discipline of nursing indicate that research findings should not stand alone, but be presented within a framework of application of theory. Therefore, under the umbrella of the conceptual framework of ambivalence, this section provides a detailed review of the findings for the purpose of informing snow sport safety interventional programs and health policy.

The fields of health promotion and injury reduction recognize the key role that ambivalence plays in instating behavioral change (W. R. Miller, 2004; W. R. Miller

& Rollnick, 2002; Proschaska et al., 1997). Inconsistency is a hallmark of ambivalence. Thus, this section first summarizes how the sample provided evidence that ambivalence was a major part of their world. The findings about risk taking and the motivators and barriers to helmet wear are also reviewed in order to provide specifics for intervention consideration. Application for health policy follows. The section concludes with suggestions for the next steps of research

A Host of Inconsistencies

An element of emotional uncertainty is associated with any behavior change (W. R. Miller & Rollnick, 2002; Rollnick, Mason, & Butler, 1999). This study uncovered a myriad of inconsistent perceptions. This typifies ambivalence. These conflicting perceptions were held simultaneously, sometimes without recognizing their incompatibility. Table 8 summarizes some of the inconsistent statements voiced.

Table 8

Inconsistent Viewpoints: Evidence of Ambivalence

Inconsistent Viewpoints: Evidence of Ambivalence	
First Viewpoint	Confounding Perspective
Desire to be just like peers.	Strive for status and levels of "koolness."
Believe no competition exists.	Rank each other on status.
Crave routine and balance in their lives.	Need excitement and variety.
Seek zen-like centeredness and relaxation.	Use speed and exertion to achieve calm.
State risk adds to the thrill of the sport.	Deny personal risk when seeking thrills.
Deny sport is risky.	Tell stories of "gnarly" exploits.
Recognize caution should be exerted.	Press on through fears to impress peers.
Acknowledge injuries can occur.	Still engage in risky maneuvers.
Overcome situations with skill, self-confidence and calculated risk taking.	Believe risk is everywhere and that "stuff happens."
Respect for personal choice.	Succumb to group behaviors outside personal norms.
Belief in personal choice.	Agree with parental enforcement and mandatory helmet wear for minors.
Rely on auditory input for safety.	Use loud musical entertainment while ski.

Inconsistencies and Developmental Norms

Although these inconsistencies were articulated across all age groups, interventional programs may benefit from the insights gained when the responses are split into teen and young adult categories. This step is critically important, because the quantitative risk attitude and propensity scores did not vary by age group. The high risk scores did not diminish with age; however, the comments about risk taking did diminish.

Teens. The teens in the study were more likely to "go for it" or to engage in activities without thinking and with an opinion based mostly on emotional and sensory input. The teens did not take the time to consider the consequences or ramifications of their actions to the same degree as those older than 18. They had more difficulty articulating the rationale behind their behavior on the slopes. These observations were congruent with the adolescent literature base and expected developmental norms (Jessor, 1991; Pickett et al., 2002; Tursz, 2000)

The teens responded to inquires requesting additional insight into their actions with declarative statements of "because" and "that's the way it is," demonstrating a lack of personal reflection. During the conversation, they were more likely to agree with a group consensus than stand on their opinions. This mirrored the echo boomer tendency to take their cues from their peers (Kroft, 2005; Levine, 2005). Therefore, within an intervention, this group of snow sporters may benefit from hearing about the reasons and decisions made by their peers as a basis to begin their own journey of personal insight.

College Students. The college students, on the other hand, were more relativistic and likely to think they dealt with risks proactively. Those between the age of 18 and 22 were more likely to display a nascent understanding that they held inconsistent perceptions. This group scored higher on disinhibited behavior and was motivated by physical sensations more than those older or younger. This finding reflected Arnett's work on emerging adults (those less than age 25) (2000). Like the teens, college students had not taken the time to consider the implications of their slopeside behaviors, but they indicated that they appreciated the opportunity to do so. These young adults were not restrained by the parental oversight imposed on teens or the social constraints placed on mature adults. Thus, they had the freedom to be more exploratory in testing the boundaries of their lives (Arnett). They demonstrated more willingness to consider on-site or immediate behavioral change.

Young Adults. Interestingly, the young adults aged 23-30 were more unyielding in their opinions. During the discussions, they respectfully listened to dissenting perspectives, but then countered with their own arguments. Their decisions, like those of the teens, were sometimes based on emotional beliefs and anecdotal evidence. They were less likely to voice a consideration of change in their helmet wear practices. Although they also held the inconsistent beliefs of the younger members in the study, they did not appear willing to discuss the possibility of altering their stance in the groups. Perhaps the difference in those older than 23 years was based on the self-certainty that comes with maturity. This study was not designed to provide that answer.

Echo Boomer Developmental Characteristics

Snow sporters in this study demonstrated some characteristics atypical of the echo boomer descriptors of instant gratification, an inability to amuse themselves in unstructured settings, and an inability to sense "what they are good at and what they're not" (Kroft, 2005, P47; Levine, 2005). Snow sports are very unstructured and hard to master; they are not conducive to a defined "right" answer and a "one way to do things" comfort zone associated with echo boomer cohorts. The fact that these snow sporters found the sport so attractive identifies them as a subset of the echo boomer generation.

These echo boomers may be attracted to snow sports as an escape from the structure of their day-to-day lives. The excitement of the slopes did provide an intensity comparable to the video games in their lives (Levine, 2005). The sports had physically rewarding sensations which have been determined to be critical to members of this generation. Snow sporter willingness to repeatedly try new tricks over a period of time before achieving success reflected a generational characteristic of a strong work ethic (Kroft, 2005; Levine, 2005). The challenge of trying to master a new skill kept them interested and motivated. Once the challenge was gone, so was the motivation; hence, riskier tricks must be tried (Pain & Pain, 2005). The Williams Inference site noted, "In games, failure is part of success. Anybody who tries a new game fails multiple times before getting it right, and that has made the Gamer Generation more willing to take risks." (Inference, 2004)

Boredom is known to play a role in typical echo boomer lives. They crave variety, but if they do not see progress or are not recognized as instant experts, they

lose interest. (Kroft, 2005). For this group of experienced snow sporters, extended duration and frequency of sport participation did not induce boredom. They believed there is always room for improvement. This finding is less strong within the snow boarder subgroup where boredom scores were higher, particularly in those with the least experience. This was not associated with age group. Very experienced teens scored similarly to adults on the boredom scale; less experienced adults scored higher than experienced adults. It was the duration of experience within the sport that was associated with decreased boredom scores, not maturation.

Inconsistency and Interventional Approach

The predominant college educated makeup of most snow sport demographics bodes well for interventional approaches that appeal to information and logic. It should be noted, however, that these youthful participants were heavily influenced by peers, emotions and ever shifting intentions, even up to age 30. Hence, a predominantly cognition-based intervention would not be successful with snow sporters (Whitehead & Russell, 2004).

Ambivalence and Risk Taking Behaviors

The literature on motivational interviewing and behavioral change describes multiple reasons and rationales used by individuals to resist change (W. R. Miller, 2004; W. R. Miller & Rollnick, 2002; Proschaska et al., 1997). Two major themes cited are denial of vulnerability and a false sense of security. For adolescents, defiance of norms has been touted as the hallmark for why behavioral change is difficult (Jessor, 1991).

Denial of Vulnerability

A common thread throughout the injury literature is that youth believe they are invulnerable to injury (Gonzalez & Field, 1994; Pickett et al., 2002; Yates, 1992). Yet, in this study snow sporters freely admitted injury was an expected part of the sport. Snow sporters did not adhere to an optimistic bias that injury would not happen to them (Lonero, 1998). They believed their skill level protected them from harm. Focus was placed on having control over the factors that may lead to unsuccessful tricks, not on the potential for injury-inducing falls. Thygerson's work on perception of risk would attribute this mindset of decreased risk to participant familiarity with their sport and feelings of control (1986).

False Sense of Security

This sense of control was described by the participants as calculated risk taking. The fine line between being in control of a situation and losing control was called "the edge" (Anshel, 2003; Pain & Pain, 2005). Snow sporters seeking to increase their repertoire of tricks pushed the limits of that edge. The progression of control was incremental and required multiple attempts. Unsuccessful landings were frequently associated with minor injuries, but sometimes also with fractures and significant pain. The costs of physical discomfort were considered "worth it" for the sense of personal fulfillment and victory when achieving a new skill. The proponents of Prospect Theory would state that snow sporters believed the gains outweighed the potential losses in the calculation of risk taking (Kahneman & Tversky, 1979). Hence, the perceived net gain induced additional risk taking.

Skiers perceived they held onto the control of their run with fine tuned precision. The snowboarders approached the run as a challenge, toying with it, and seeking to master it by defying the limits of that control. Le Breton (2000) referred to this type of activity as playing symbolically with death. Both skiers and snowboarders must overcome personal fear and restrain caution in order to push the edge of control to encompass riskier maneuvers. Neither group outscored the other on risk propensity scales, but the manner in which they approached the edge of control differed. Snowboarders scored higher on SS and Boredom Susceptibility, indicating they were more easily distracted and desired more control-defying experiences than skiers. Boarders rode on the brink of being out of control; skiers held continual focus. This difference did not vary with age or gender, indicating interventions should be uniquely targeted for each equipment style.

Illusion of Control. Caffray and Schneider (2000) reported that adolescent beliefs about risk calculation were rationalizations and an illusion of control. The elements of convincing self-talk and reliance on skills induced additional risky behaviors. Ewert (1994) found that although risk taking occurs in athletes with greater experience, there was a basis to believe that experience results in better choices about what maneuvers to attempt. Among these snow sporters, none had less than four years of experience, lending credence to the belief that a modicum of experienced-based judgment entered into their risk calculations. However, Thygerson (1986) would caution that these snow sporters would also be subject to an under-estimation of the risks involved due to complacent familiarity.

Focus group respondents indicated at some level that they understood calculated control was an illusion. They referenced how weather elements, terrain conditions, and others on the hill were external forces with which they had to contend. Simultaneously, they espoused beliefs that they were in control of risks, yet could still be victims of "stuff happening" from these external elements. Statements ranged from perceptions of "risk is everywhere," with incredulity concerning how certain falls occurred, to beliefs in themselves as being capable of handling the vagaries of slope side conditions. This constant shifting of focus from feelings of personal control to perceptions of no control over external variables underscored the adolescent angst and ambivalence of trying to make sense of their experiences (Jessor, 1991; W. R. Miller & Rollnick, 2002). This ambivalence highlighted the fact that control was an illusion (Caffray & Schneider, 2000). It was hard for these experienced snow sporters to appreciate the true risks inherent in a very familiar activity (Thygerson, 1986).

Echo boomer desires to maintain "normalcy" and balance in their lives can be interpreted as efforts to control their lives. Experts attribute this to a lifetime of being over-scheduled (Alch, 2000; Kroft, 2005). Echo boomers require variety to keep themselves interested, but they also crave stability. They have difficulties tolerating being without boundaries or having large degrees of latitude (Levine, 2005). They seek control to keep a sense of balance. Therefore, youthful snow sporters, faced with a very unstructured sport, turned to ideas of control over the situation for stability and balance.

Defiance of Norms

A common characteristic associated with youthful risk-taking is "adolescent defiance of norms" (Gonzalez & Field, 1994; Turner et al., 2002; Yates, 1992). This attribute was strongly modeled by the baby boomer generation; however, this echo boomer cohort revealed an alternative perspective on this issue. Snow sporters did not view themselves as defiant; rather, the rejection of extreme behaviors was a consistent thread in the discussion. There was expressed disdain for "idiots" or people who were out-of-control, marring the day for others. Upholding the norm of "everyone on the slopes enjoying themselves without disruption" was strongly regarded. Risk motivation scores tended toward median values without tendencies toward rejection of norms. These scores reflected acceptance of others and the intent to live in harmony. These are characteristic echo boomer values (Alch, 2000; Kroft, 2005; Levine, 2005).

The literature sometimes defined defiance as reactance (Brehm & Brehm, 1981; Seibel & Dowd, 1999). Reactance was typically associated with marginalized, anti-social groups. The uniform rejection of "idiots" supported the conclusion that recreational snow sporters were not accurately portrayed by the media as anti-social persons. The persona of a renegade "bad boy" originally associated with the birth of snowboarding has been tempered with the mainstream adoption of snow boarding by young middle class athletes. It has also changed with the advent of a new, less defiant generation. Interventions, therefore, should not be solely focused on any "bad" behaviors on the slopes, but on how to make the experience more universally enjoyable.

Ambivalence toward Helmets

Ambivalent comments and perceptions infused everything said about helmets. There was much uncertainty about the decision to adopt helmets and the actual risk of head injury. Age group was not statistically associated with helmet use or rejection. Wear patterns were polar; those favoring continuous wear comprised only a smaller percentage of the sample (16%). Theory of Diffusion literature would place these participants within the "Innovator" and "Early Adoptor" groups. As anticipated, they were vocal advocates of their decision (Rogers, 1995).

The majority of the group (62%) never wore helmets, thus constituting a target for potential behavioral interventions. In light of the significant number of remarks toward potential consideration of wear at the end of the discussions, most of these snow sporters were at the consideration/contemplation stage for positive health care change (W. R. Miller & Rollnick, 2002; Proschaska et al., 1997).

Since echo boomers take their cues from key peers, vocal adherents of helmet use may be recruited as peer moderators to facilitate program success (W. R. Miller & Rollnick, 2002; Pickett et al., 2002; Rollnick et al., 1999). Prestige Seeking and Social Influence scores, though higher in the teen participants, did not significantly diminish with age for study participants. Individual choice is known to be a major value for echo boomers (Kroft, 2005; Levine, 2005). The hallmarks of acceptance of individuality, diversity and intent to co-exist in harmony with others also ranked high with these snow sporters (Alch, 2000; Kroft; Levine). Therefore, within interventions, group input must be valued, as well as personal choice. Everyone must be given the personal freedom for self-determining wear status. This approach may satisfy one of

the multiple inconsistencies in perceptions found throughout the study — the compelling need to be part of a group, but to be also seen as an individual.

Interventional programs need to acknowledge that the adoption of helmets will temporarily upset an individual's sense of balance and control. Echo boomer experts caution that an incremental change must be instigated with echo boomer agreement and considered a positive move (Kroft, 2005). If an intervention program touting helmets were considered too radical a change or too upsetting to "normalcy," helmet use would be rejected outright. Ideas for change must appeal to the snow sporter's sense of personal achievement. For example, participants rejected helmets for "safety," because they believed its use implied some lack in their skill level; however, when helmets were defined as an emblem of advanced skill, future wear was given positive acceptance

Barriers to Helmet Wear

Table 9 below is a modification of Table 1 from Chapter Two. It highlights the significant consistency between common objections to helmet wear in bicycle research and this study (as indicated by an asterisk). Therefore, ideas from programs facilitating helmet use in other sports may prove useful in snow sport settings as well.

Table 9

Compiled Objections to Helmets

Commonly Repeated Objections to Wearing Helmets	
They make me too hot. *	My head gets too cold.
They are too expensive. *	It impairs my hearing. *
It changes my center of balance. *	It restricts my freedom. *
They are only for kids.	You've gotta die someday.
Won't protect you. *	Didn't know about them
It makes me look like a "dork." *	I'd rather wear my favorite hat. *
I've never worn one before.*	I never fall. *
No need. *	Causes more problems. *
It's one more thing to carry. *	It causes more injuries than they help.

Note: * indicates current study finding

As found in the bicycle literature, the objections and barriers to helmet wear were predominately based on emotion and rationalizations. Strong deterrents included peer opinion and fashion consciousness. Snowboarders were more likely to assign value to fashion considerations. Fashion dictates neither vary in impact by gender nor fade in importance with age. A fashion objection associated with the physical exertion of snow sports was a sweat-matted hair known as "helmet head." Men and women both objected to the loss of flowing tresses and coifed hair.

Echo boomers turn primarily to peers for direction, but they are also more likely to follow a parental lead than previous generations (Alch, 2000; Kroft, 2005; Levine, 2005). They noted the lack of parental use of helmets typically resulted in helmet rejection. Celebrity input and media messages were not given any credence in the decision to wear a helmet by snow sporters, a trend also found in echo boomer literature (Alch; Kroft). What is voiced, however, did not mirror the reality that consumer behavior in this population group is heavily influenced by high profile celebrities.

Snow sporters were concerned about cost issues associated with the initial purchase of the equipment. Free or low cost programs are not as common as in the bicycle community. This difference may be associated with the large difference in helmet cost between the sports (snow sport helmets being more expensive) and the much larger number of bicycle riders compared to snow sporters. Costs cannot be reduced with wearing one helmet for both sports. The two types of helmets are not interchangeable, as the mechanics differ for each sport and the construction of the helmet varies accordingly (A. S. Levy & R. H. Smith, 2000; Macnab et al., 2002; J. Shealy et al., 1997).

The rapid proliferation of helmet use in the past decade has eliminated the Table 1 objection of not knowing about helmets. Other objections to helmet use, which were not voiced in the study, were references to inevitable death and the issue of additional injury causation. This study had no fatalistic references or significant risk attitude scorings to indicate it was pointless to use safety equipment. The only group coming close to an implication of irrelevancy of safety was those who had sustained a prior head injury (RMQ IR scores). Sports research demonstrates that those who have been injured once are more likely to be injured again (Chalmers, 2002; Van Mechelen et al., 1996). Of concern, therefore, was the lack of helmet wear in snow sporters with a previous head injury, a trend also found in the literature (Anderson et al., 2004).

The issues of additional injury causation were addressed tangentially in the strong advocacy of helmet adoption in order to protect themselves from others. The concussive force of plastic helmet upon another's un-helmeted head was offered as a

potential injury source. Unlike bicycle findings, additional injuries were motivators to adopt helmets, not reasons for rejection.

Motivations to Wear Helmets

Behaviorial change programs may benefit from insights on what motivated the participants to adopt helmets. Such motivations ranged from safety precautions to perceptions that helmets were stylish and "kool." Logical decision making was cited as the basis for most adoption choices. Those who believed the helmet represented advancing skill were more likely to wear them. Wear rates reflected literature reports that those who frequent resorts more often were more likely to adopt helmets (Anderson et al., 2004; Buller et al., 2003). Because the sample was skewed toward college bound and university students, the previously reported difference in wear favoring people with higher education was not found (Anderson et al.; Buller et al.). Similar to previously published research, snow sporters rejected the idea that they wore helmets based on prior use with bicycles or from familiarly since childhood (2003). Snow sporters insisted the decisions were independently made.

Previous snow sport studies indicated that male gender and snowboarding were associated with more helmet use (Anderson et al., 2004; Buller et al., 2003). In this study, women wore helmets as much as men, and wear patterns were not associated with equipment. Overall, the study participants mirrored the national wear rates of 16%. Unlike bicycle literature findings, wear rates did not decrease with age. Bicycle research has primarily dealt with enforced helmet wear for pre-teen juveniles, while this study involved young adults, Wearing rates were not expected to be similar.

Situational Use

As in the bicycle literature, snow sporters perceived helmets as not being necessary every day or in every situation. Many respondents believed taking it easy or accompanying inexperienced beginners did not require helmet use. Beginner slopes and easy runs were deemed to be no-helmet areas for those with experience. Back-country and double black steep chutes were generally considered helmet zones. No agreement existed on those designations, but risk intervention programs must incorporate these perceptions into their safety programs. Programs need to address the reality of risk everywhere on the slopes and for all activities, not just for beginners.

Even the most ardent anti-helmet supporters in the study voiced strong agreement that children and novice snow sport recreationists should wear helmets. Remembrance of personal lack of fear and decision making at younger ages fueled this stance. Beginners were also cited to fall more often, a pattern documented in the numerous epidemiological studies cited in Chapter Two.

Increased Risk Taking and Helmets

Most pro-helmet comments centered on safety and injury protection; however, neither the most risk averse or cautious were more likely to adopt helmets. Ettlinger and Shealy's (1999) supposition that people wore helmets in order to attempt riskier maneuvers was confirmed. Those with the highest risk-indicating Experience Seeking scores were more apt to wear them. Snow sporters used helmets to learn more complex tricks. These maneuvers facilitated the attainment of the desired rush of sensations which attract many thrill and experience seekers to the sport.

Situational helmet use to achieve added excitement was endorsed, even by those with an anti-helmet stance. This evidence supported the previous observation that snow sporters age 15 to 30 did not have feelings of invulnerability. They recognized the risks were greater when learning new things, and adopted what they perceived to be extra protection. They were aware that they still needed the innate skills and readiness to progress to this level, but the helmet provided a sense of security to help overcome their fears and hesitancies. One participant cited a considered decision not to adopt a helmet, because he understood his personal tendency to take risks would be fostered by the false security.

In considering this trend of helmet wear for other than safety considerations, the lack of endorsement by the NSP and ski areas makes legal sense (Adams, 1999; Frangos, 2002). Any emphasis on the protective quality of helmets must be considered in the light of additional risk taking. Touting safety when it cannot be assured is not legally sound; however, the certainty of head injury reduction recently published provides evidence of overall risk reduction with helmets (Hagel et al., 2005). No doubt some of the helmeted guests in Hagel's study wore them for risk taking purposes. A significant reduction in injury risk was obtained by all regardless of the motivation for use. Therefore, helmet campaigns emphasizing informed use of the equipment are still a wise undertaking.

Any discussion about the situational use of helmets may inadvertently lead those not interested in aerial tricks to believe that they do not need helmets. With this group, the emphasis must be placed on the possibility of injury anywhere in the resort. It is a mistake to believe that injuries only occur on the expert slopes or when

doing aerials. Most injuries are sustained on beginner and intermediate slopes (Bergstrom & Ekeland, 2004). There are no safe zones on the mountain.

Summary of Suggestions for Health Promotion Programs

This study has uncovered multiple findings for interventional programs to consider incorporating into their schema of topics and approaches for snow sporters. Throughout the paper, specific suggestions have been made for incorporation into intervention programs. The table below does not list these suggestions in any hierarchical order, but is compiled for easy reader reference.

Table 10

Suggestions for Intervention Programs

Observation	Suggestion
1. Helmets used to facilitate taking more risky moves.	1. Explain limits of manufactured protection.
2. Females are risk takers too.	2. Do not focus only on young males. Recognize any innate caution is overcome by peer pressure & self desire.
3. Snow sporters deny they are risk takers, but all score above national norms.	3. Sharing of exploits and scores leads to self-awareness.
4. Snow sporters believe it is "normal" to take risks because "everyone" does.	4. Place emphasis on other aspects of "fun" beyond risk taking; discredit the "everyone" theory.
5. Peer influences supersede personal norms; celebrities are not valued.	5. Recruit peers to be counselors and role models, not celebrity endorsements.
6. They do not deny vulnerability to injury, but believe skill protects them.	6. Place emphasis that safety parameters are required due to advanced skill set; do not imply they are not skilled.
7. Risk tendencies extend beyond typical age drop off points.	7. Do not limit interventions only to children and teens.
8. They believe cautiousness induces more injuries.	8. Emphasis placed on incremental changes in order to quickly regain balance and "normalcy."
9. Youngest participants and snowboarders more easily bored.	9. Rapid changes of topics and rapid pace of intervention works better.
10. Issues of "edge of control" are approached differently by skiers and riders.	10. Consider separate interventions for each equipment style.

Observation	Suggestion
11. Head injury discounted by odds of occurrence.	11. Demonstrate it only takes one injury to be major.
12. Previous head injured do not wear helmets more often.	12. Identify concussion cases and personally approach on topic of helmets.
13. Echo boomers look to parents as role models.	13. Focus on parents for helmet wear.
14. Echo boomers appreciate rules and boundaries.	14. Encourage value of everyone on the mountain having a great time

Application for Health Policy

This emphasis on helmet intervention logically yields to a discussion of whether health policy should be implemented to influence the wear of helmets on the slopes.The participants of this study generally agreed that specific segments of the snow sport population should be wearing helmets; however, they will not endorse legislative efforts to enforce such wear for all snow sporters. They would support laws for juveniles similar to the laws for bicycle use. They prefer parental, rather than legislative, enforcement. Policy makers should note that these statements give no indication that the wear rates for snow sport helmets would differ from the poor wear rates found in jurisdictions currently mandating bicycle helmet use (D. Thompson et al., 2002). Laws do not automatically translate into additional use without enforcement. Helmet laws are not high priority for law enforcement agencies.

Snow sporters believed consumer education and personal decision making were the best approach, not mandated wear. The swing toward a more voluntary adoption of helmets has occurred. Enacting legislative mandates at this time may interfere with this spontaneous change process. If the greater common good is achieved through voluntary adoption, such change would be more likely to endure and be less expensive for the community. Behavioral change is more likely to be

maintained if it comes from internal, not external, motivations (Proschaska et al., 1997).

Next Steps for Research

In addition to the interventional program referenced throughout this discussion, there is the next logical step of a targeted survey of young adults and teens concerning their opinions of helmet wear and perceptions of risk taking tendencies. Several questions arise which require research: a) Does a ski patroller or other supervising adult presence change the risk taking behaviors in a terrain park; b) do other demographic segments such as young children, pre-teens, those over 55, ski patrollers, etc., differ in risk taking attitudes; c) why do parents of youngsters in helmets typically not wear helmets themselves; d) is snow sport helmet wear associated with helmet wear in other sports; e) what are the parental responses to the finding that helmet wear may spur added risk taking; and f) in a larger sample, are the motivations for risk taking and boredom susceptibility really different between skiers and snowboarders?

The Final Word

Anecdotal and editorial opinions calling for the adoption of helmets now stand on evidence gained directly from snow sporters themselves. Key insights were gained that may facilitate the promotion of head injury prevention on the slopes. These recreationists scored high on risk taking scales, but they do not believe they are risk takers. They rely on an illusion of control. This image of only having fun, together with the complacency that occurs with familiarity of an activity, places them in harm's way. The significant finding that they are willing to adopt protective

equipment to extend their risk taking activities provides an impetus to field interventional programs intent on limiting injury. In as much as the target population does not believe themselves to be at risk, the need for behavioral change interventions becomes more urgent.

REFERENCES

Adams, J. (1999). *Cars, cholera, and cows: The management of risk and uncertainty.* London: Cato Institute.

Adams, J., & Hillman, M. (2001). The risk compensation theory and bicycle helmets. *Injury Prevention, 7*, 86-91.

Ajzen, I. (1988). *Attitudes, Personality, and Behavior.* Chicago: The Dorsey Press.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179-211.

Alch, M. E. (2000). The echo-boom generation: A growing force in american society. *The Futurist*, 42-46.

Aluja, A., Garcia, O., & Garcia, L. F. (2003). Relationships among extraversion, openness to experience, and sensation seeking. *Personality & Individual Differences, 35*, 671-680.

AMA, C. o. S. A. (1997). *Report 1 of the Council on Scientific Affairs (I-97): helmets for recreational skiing and other winter sports for children and adolescents.* Chicago, IL: American Medical Association.

American Academy of Pediatrics Commission on Clinical Policies and Research. (1999). The management of minor closed head injuries in children. *Pediatrics, 104*, 1407-1415.

Anderson, P. A., Buller, D. B., Scott, M. D., Walkosz, B. J., Voeks, J. H., Cutter, G. R., et al. (2004). Prevalence and diffusion of helmet use at ski areas in Western North America in 2001-2002. *Injury Prevention, 10*(6), 358-362.

Anshel, M. H. (2003). *Sport Psychology: From Theory to Practice* (4th ed.). San Francisco: Benjamin Cummings.

Arnett, J. J. (2000). Emergencing adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*(5), 469-480.

Association, U. S. S. (2005). Alpine Competition Manual 2004-2005. Retrieved March 30, 2005, from www.ussa.org

Attewell, R., Glase, K., & McFadden, M. (2001). Bicycle helmet efficacy: a meta-analysis. *Accident Analysis & Prevention, 33*(3), 345-352.

Baker, S. P., & Teret, S. P. (1981). Freedom and protection: a balancing of interests. *American Journal of Public Health, 71*(3), 295-297.

Bergstrom, K. A., Askild, O., Jrgensen, N., & Ekeland, A. (1999). Evaluation of skiing injuries by Injury Severity Score. *Scandinavian Journal of Medicine and Science in Sports, 9*(2), 110-113.

Bergstrom, K. A., & Ekeland, A. (2004). Effect of trail design and grooming on the incidence of injuries at alpine ski areas. *British Journal of Sports Medicine, 38*, 264-268.

Bevins, R. A. (2001). Novelty seeking and reward: implications for the study of high-risk behaviors. *Current Directions in Psychological Science, 10*(6), 189-193.

Bladin, C., & McCrory, P. (1995). Snowboarding injuries: an overview. *Sports Medicine, 19*(5), 358-364.

Bouter, L. M., Knipschild, P. G., Feij, J. A., & Volovics, A. (1988). Sensation seeking and injury risk in downhill skiing. *Personality & Individual Differences, 9*(3), 667-673.

Bowman, W. D., & Johe, D. H. (2003). *Outdoor Emergency Care: Comprehensive Prehospital Care for NonUrban Settings.* (4th ed.). Sudbury, Massachusetts: Jones and Barlett Publishers.

Brehm, S. S., & Brehm, J. W. (1981). *Psychological reactance: A theory of freedom and control.* New York: Academic Press.

Britt, J., Silver, I., & Rivara, F. (1998). Bicycle helmet promotion among low income preschool children. *Injury Prevention, 4*(4), 280-283.

Brooke, J. (1999). Brakes being put on reckless skiers. *New York Times,* p. 14.

Buller, D. B., Anderson, P. A., Walkosz, B. J., Scott, M. D., Cutter, G. R., Dignan, M. B., et al. (2003). The prevalence and predictors of helmet use by skiers and snowboarders at ski areas in western North America in 2001. *The Journal of Trauma, 55*(5), 939-945.

Caffray, C. M., & Schneider, S. L. (2000). Why do they do it? Affective motivators in adolescents' decisions to participate in risk behaviours. *Cognition and Emotion, 14*(4), 543-576.

Cantu, R. C. (1998). Second-impact syndrome. *Clinical Sports Medicine, 17*(1), 37-44.

Carey, M. A., & Smith, M. W. (1994). Capturing the group effect in focus groups: A special concern in analysis. *Qualitative Health Research, 4*(1), 123-127.

Chalmers, D. J. (2002). Injury prevention in sports: not yet part of the game? *Injury Prevention, 8 (Suppl 4)*(IV), 22-26.

Cherpitel, C., Meyers, A., & Perrine, M. (1998). Alcohol consumption, sensation seeking and ski injury: a case controlled study. *Journal of Studies on Alcohol, 59*(2), 216- 221.

Churilla, A., & Baker, D. (2002, May 25). *The influence of gender, resiliency, and self-perception on perception of risk.* Paper presented at the Canadian Association for Leisure Studies, Edmonton, Alberta.

Clingenpeel, J. M., & Marshall, S. W. (2003). Helmet rental practices at United States ski areas: a national survey. *Injury Prevention, 9*(4), 317-321.

Cogan, N., & Brown, R. I. F. (1999). Metamotivational dominance, states and injuries in risk and safe sports. *Personality & Individual Differences, 27*, 503-518.

Cohen, S., & Trinker, G. (1999). Should you wear a helmet? *Ski, 64*, 46.

Collins, S., Grindel, S. H., Lovell, M. R., Dede, D. E., Mosher, D. J., & Phalin, B. R. (1999). Relationship between concussion and neurophysiological performance in college football players. *JAMA, 282*, 964-970.

Connolly, P. M. (1981). *An exploratory study of adults engaging in high risk sport of ski-ing.* Unpublished master's, Rutger's University.

Consumer Product Safety Commission. (1999). *Skiing helmets: an evaluation of the potential to reduce head injury.* Washington, D. C.

Creswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions.* Thousand Oaks, CA: Sage Publications, Inc.

Creswell, J. W., Plano-Clark, V. L., Gutmann, M. L., & Hanson, W. E. (2003). Advanced mixed methods research designs. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 209-240). Thousand Oaks, CA: Sage Publications, Inc.

Cronin, C. (1991). Sensation seeking among mountain climbers. *Journal of Personality and Individual Differences, 12*(6), 633-654.

Crossley, M. L. (2003). "Would you consider yourself a healthy person?": using focus groups to explore health as a moral phenomenon. *Journal of Health Psychology, 8*(5), 501-514.

Davidson, T. M., & Laloitis, A. T. (1996). Snowboarding injuries, a four-year study with comparison with alpine ski injuries. *Western Journal of Medicine, 64*, 231-237.

Deditius-Island, H., & Caruso, J. C. (2002). An examination of the reliability of scores from Zuckerman's Sensation Seeking Scales, Form V. *Educational & Psychological Measurement, 62*(4), 728-734.

Dennis, M. E. (1994). Risk behavior analysis. *The Chronicle of ADTSEA, 42*(4), 1-4.

Denzin, N. K. (1970). *The research act: A theoretical introduction to sociological methods.* Chicago: Aldine.

Diamond, P., Gale, S., & Denkhaus, H. (2001). Head injuries in skiers: an analysis of injury severity and outcome. *Brain Injury, 15*(5), 429-434.

Diebert, M., Aronsson, D., Johnson, R., Ettlinger, C., & Shealy, J. (1998). Skiing injuries in children, adolescents, and adults. *The Journal of Bone and Joint Surgery American Volume, 80*(1), 25-32.

DiLillo, D., & Tremblay, G. (2001). Maternal and child reports of behavioral compensation in response to safety equipment usage. *Journal of Pediatric Psychology, 26*(3), 175-184.

Dohjima, T., Sumi, Y., Ohno, T., Sumi, H., & Shimizu, K. (2001). The dangers of snowboarding: A 9-year prospective comparison of snowboarding and skiing injuries. *Acta Orthopaedica Scandiavica, 72*(6), 657-660.

Douglas, M. (1992). *Risk and Blame: essays in cultural theory.* New York: Routledge.

Ettlinger, C., & Shealy, J. (1999, 2000). Skier Issue #1. *VSR Opinion* Retrieved 17 August, 2005, from www.vermontskisafety.com

Ewert, A. W. (1994). Playing the edge: Motivation and risk-taking in a high-altitude wildernesslike environment. *Environment & Behavior, 26*(1), 3-22.

Fatsis, S., & Costello, D. (1999, Jan 8). Skiing down a slippery slope. Fancy new ski equipment and ski-resort upgrades are having an unidentified new consequence: A jump in debilitating, even catastrophic injuries. *The Wall Street Journal,* p. W1.

Ferra, P., McKenna, D., & Gilman, E. (1999). Injury patterns with snowboarding. *The American Journal of Sports Medicine, 17*(6), 575-577.

Fontana, A., & Frey, J. H. (2000). The interview from structured questions to negotiated text. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (2nd ed., pp. 645-672). Thousand Oaks, CA: Sage Publications, Inc.

Frangos, A. (2002, November 24). Forget the ski cap and get a helmet. *The News Tribune,* p. D8.

Fukuda, O., Takaba, M., Saito, T., & Endo, S. (2001). Head injuries in snowboarders compared with head injuries in skiers. A prospective analysis of 1076 patients

from 1994 to 1999 in Niigata, Japan. *The American Journal of Sports Medicine, 29*(4), 437-440.

Geller, E. S. (1996). Do we compensate for safety? Retrieved June, 2004, from www.geocities.com/MotorCity/Lane/4666/biker83.html

Glanz, K., Lewis, F. M., & Rimer, B. K. (Eds.). (1997). *Health Behavior and Health Education: Theory, Research and Practice* (2nd ed.). San Francisco: Jossey-Bass.

Goma I Freiananet, M. (1991). Personality profile of subjects engaged in high physical risk sports. *Personality & Individual Differences, 12*(10), 1087-1093.

Gonzalez, J., & Field, T. (1994). Adolescents' perceptions of their risk-taking behavior. *Adolescence, 29*(115), 701-711.

Goulet, C., Regnier, G., Grimard, G., Valois, P., & Villeneuve, P. (1999). Risk factors associated with alpine skiing injuries in children. A case controlled study. *The American Journal of Sports Medicine, 27*(5), 644-650.

Greenbaum, T. L. (1988). *The Practical Handbook and Guide to Focus Group Research.* Lexington, Massachusetts: Lexington Books.

Hackam, D., Kreller, M., & Pearl, R. (1999). Snow-related recreational injuries in children: Assessment of morbidity and management strategies. *Journal of Pediatric Surgery, 34*(1), 65-68, discussion 69.

Hagel, B., Meeuwisse, W., Mohtadi, N., & Fick, G. (1999). Skiing and snowboarding injuries in the children and adolescent of Southern Alberta. *Clinical Journal of Sport Medicine, 9*(1), 9-17.

Hagel, B. E., Goulet, C., Platt, R. W., & Pless, B. (2004). Injuries among skiers and snowboarders in Quebec. *British Medical Journal, 15*(3), 279-286.

Hagel, B. E., Meeuwisse, W., Mohtadi, N., & Fick, G. (1999). Skiing and snowboarding injuries in the children and adolescent of Southern Alberta. *Clinical Journal of Sport Medicine, 9*(1), 9-17.

Hagel, B. E., Pless, B., Goulet, C., Platt, R. W., & Robitaille, Y. (2005). Effectiveness of helmets in skiers and snowboarders: case-control and case crossover study. *British Medical Journal, 330*(7486), 281-283.

Hagel, B. E., Pless, B., & Platt, R. W. (2003). Trends in emergency department reported head and neck injuries among skiers and snowboarders. *Canadian Journal of Public Health, 94*, 458-462.

Harrison, J. D., Young, J. M., Butow, P., Salkeld, G., & Solomon, M. J. (2005). Is it worth the risk? A systematic review of instruments that measure risk propensity for use in the health setting. *Social Science & Medicine, 6016*, 1385-1396.

Hendrickson, S. G., & Becker, H. (1998). Impact of a theory based intervention to increase bicycle helmet use in low income children. *Injury Prevention, 4*(2), 126-131.

Hennessey, T., Morgan, S., Elliot, J., Offner, P., & Ferrari, J. (2002). Helmet availability at skiing and snowboarding rental shops: a survey of Colorado ski resorts rental practices. *American Journal of Preventive Medicine, 22*(2), 110-112.

Hentschel, S., Hader, W., & Boyd, M. (2001). Head injuries in skiers and snowboarders in British Columbia. *The Canadian Journal of Neurological Sciences, 28*(1), 42-46.

Horvath, R., & Zuckerman, M. (1993). Sensation seeking, risk appraisal, and risk behavior. *Personality & Individual Differences, 14*, 41-52.

Hulley, S. B., Cummings, S. R., Browner, W. S., Grady, D., Hearst, N., & Newman, T. B. (2001). *Designing Clinical Research: An epidemiologic approach* (Second ed.). Philadelphia: Lippincott Williams & Wilkins.

Hunter, R. E. (1999). Skiing injuries. *The American Journal of Sports Medicine, 27*(3), 381-389.

Inference, W. (2004). Report: Echo boomers.

Jacobs, L. A. (2000). An analysis of the concept of risk. *Cancer Nursing, 23*(1), 12-19.

Janesick, V. J. (2000). The choreography of qualitative research design. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (2nd ed., pp. 379-399). Thousand Oaks, CA: Sage Publications, Inc.

Janofsky, M. (2002, 31 March). Death on Colorado slopes fuel argument for ski helmets. *New York Yimes.*

Jessor, R. (1991). Risk behavior in adolescence: A psychosocial framework for understanding and action. *Journal of Adolescent Health, 12*(4), 374-390.

Johnson, R., Ettlinger, C., Shealy, J., & Meador, C. (1997). Impact of super sidecut skis on the epidemiology of skiing injuries. *Sportsverletzung Sportschaden: Organ der Gesellschaft fur Orthopadish-Traumatologishe Sportmedizin, 11*(4), 150-152.

Jonah, B. A. (1997). Sensation seeking and risky driving: a review and synthesis of the literature. *Accident Analysis and Prevention, 5*, 651-665.

Junque, C. (1999). Neurophysiological sequelae of head injury. *Rev Neurol, 28*(4), 423-429.

Jurgensen, J. (2003, January 14). Rising popularity of ski helmets a mixed blessing. *Pittsburgh Post-Gazette,* p. 2.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica, 47*, 263-291.

King, N. S., Crawford, S., & Wenden, F. J. (1999). Early prediction of persisting post-concussion symptoms following mild and moderate head injuries. *British Journal of Clinical Psychology, 38*(pt 1), 15-25.

Kontos, A. P. (2004). Perceived risk, risk taking, estimation of ability and injury among adolescent sport participants. *Journal of Pediatric Psychology, 29*(6), 447-455.

Kraemer, H. C., Kazdin, A. E., & Offord, D. R. (1997). Coming to terms with the terms of risk. *Arch Gen Psychiatry, 54*, 337-343.

Kraemer, H. C., Kazdin, A. E., Offord, D. R., Kessler, R. C., Jensen, P. S., & Kupfer, D. J. (1999). Measuring the potency of risk factors for clinical or policy significance. *Psychological Methods, 4*(3), 257-271.

Kraemer, H. C., Stice, E., Kazdin, A. E., Offord, D. R., & Kupfer, D. (2001). How do risk factors work together? Mediators, moderators, and independent, overlapping, and proxy risk factors. *American Journal of Psychiatry, 158*, 848-856.

Kroft, S. (2005). The Echo Boomers. On *60 Minutes*: CBS News.

Kushner, D. S. (2001). Concussion in sports: Minimizing the risk for complications. *American Family Physician, 64*(6), 1007-1014.

Langran, M. (2003, 1 December 2004). Snowboard Attitude Study. Retrieved 8 March, 2005, from www.ski-injury.com/sas.htm

Langran, M. (2004, 2 February 2004). Helmets on the slopes....Heads you win? Retrieved 8 March, 2005, from www.ski-injury.com/helmet.htm

Langran, M., & Selvaraj, S. (2002). Snow sports injuries in Scotland: a case-control study. *British Medical Journal, 36*, 135-140.

Laskowski, E. (1999). Snow skiing. *Physical Medicine and Rehabiliation Clinics of North America, 10*(1), 189-211.

Laviola, G., Macri, S., Morley-Fletcher, S., & Adriani, W. (2003). Risk-taking behavior in adolescent mice: Psychobiological determinants and early epigenetic influence. *Neuroscience and Biobehavioral Reviews, 27*, 19-31.

LeBreton, D. (2000). Playing symbolically with death in extreme sports. *Body and Society, 6*(1), 1-11.

Levine, M. (2005). College graduates aren't ready for the real world. *Chronicle of Higher Education, 51*(24), B11-12.

Levy, A., & Smith, R. (2000). Neurological injuries in skiers and snowboarders. *Seminars in Neurology, 20*(2), 233-245.

Levy, A. S., Hawkes, A. P., Hemminger, L. M., & Knight, S. (2002). An analysis of head injuries among skiers and snowboarders. *The Journal of Trauma: Injury, Infection, and Critical Care, 53*(4), 695-704.

Levy, A. S., & Smith, R. H. (2000). Neurologic injuries in skiers and snowboarders. *Seminars in Neurology, 20*(2), 233-245.

Lewis, T., DiLillo, D., & Peterson, L. (2004). Parental beliefs regarding developmental benefits of childhood injuries. *AMerican Journal of Health Behavior, 28*(suppl 1), S61-S68.

Lichtenstein, G., & Isham, J. (2003, January 19). Backtalk: Helmets do not make the ski slopes safer. *NY Times,* p. 11.

Lincoln, Y. S., & Guba, E. G. (2000). Paradigmatic controversies, contradictions, and emerging confluences. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (2nd ed., pp. 163-188). Thousand Oaks, CA: Sage Publications, Inc.

Lonero, L. P. (1998, April 02, 2000). *Risk mentality: Why drivers take the risk they do.* Paper presented at the World Traffic Safety Symposium, New York.

Machold, W., Kwansy, O., Gassler, P., Kolongja, A., Reddy, B., Bauer, E., et al. (2000). Risk of injury through snowboarding. *The Journal of Trauma, 48*(6), 1109-1114.

MacKenzie, E. J. (2000). Epidemiology of injuries: current trends and future challenges. *Epidemiology Reviews, 22*(1), 112-119.

Macnab, A., & Cadman, R. (1996). Demographics of alpine skiing and snowboarding injury: Lessons for prevention programs. *Injury Prevention, 24*(4), 286-289.

Macnab, A., Smith, T., Gagnon, F. A., & Macnab, M. (2002). Effect of helmet wear on the incidence of head/face abd cervical spine injuries in young skiers and snowboarders. *Injury Prevention, 8*, 324-327.

Made, C., & Elmqvist, L. G. (2004). A 10-year study of snowboard injuries in Lapland Sweden. *Scandinavian Journal of Medicine and Science in Sports, 14*(2), 128-133.

Malkin, M. J., & Rabinowitz, E. (1998). Sensation seeking and high-risk recreation. *Parks and Recreation, 33*(7), 34-40.

Mariampolski, H. (2001). *Qualitative market research.* Thousand Oaks, CA: Sage Publications, Inc.

Miller, J., Flory, K., Lynam, D., & Leukefeld, C. (2003). A test of the four-factor model of impulsivity-related traits. *Personality & Individual Differences, 34*, 1403-1418.

Miller, W. R. (2004). Motivational interviewing in service to health promotion. *American Journal of Health Promotion*, 1-10.

Miller, W. R., & Rollnick, S. (2002). *Motivational Interviewing: Preparing People to Change.* (2nd ed.). New York: The Guilford Press.

Mok, D., Gore, G., Hagel, B., Mok, E., Magdalinos, H., & Pless, B. (2004). Risk compensation in children's activities: A pilot study. *Paediactrics and Child Health, 9*(5), 327-330.

Morgan, D. L. (1996). Focus Groups. *Annual Review Sociology, 22*(129-52).

Morrongiello, B. A., & Major, K. (2002). Influence of safety gear on parental perceptions of injury risk and tolerance for children's risk taking. *Injury Prevention, 8*(27-31).

Morrow, P. L. (2003, 27 Apr-2 May). Paper presented at the International Society for Skiing Safety, St. Moritz/Pontresima, Switzerland.

Morse, J. M. (1991). Approaches to qualitative-quantitative methodological triangulation. *Nursing Research, 40*(2), 120-123.

Morse, J. M. (2003). Principles of mixed methods and multimethod research design. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 189-208). Thousand Oaks, CA: Sage Publications, Inc.

Nakaguchi, H., Fujimaki, T., Ueki, K., Takahashi, M., Yoshida, H., & Kirino, T. (1999). Snowboard head injury: prospective study in Chino, Nagano, for two seasons from 1995-1997. *The Journal of Trauma, 46*(6), 1066-1069.

NEISS, N. E. I. S. S. A. I. P. (2003). *Non-fatal sports and recreation related injuries treated in emergency departments--United States, July 2001-June 2002.* Atlanta, GA: US Centers for Disease Control.

Ognintz, E. (2004, October 10). Thrill-hungry kids might leap at a vacation on the slopes. *The News Tribune,* p. D8.

O'Neill, D., & McGlone, M. R. (1999). Injury risk in first-time snowboarders versus first-time skiers. *The American Journal of Sports Medicine, 27*(1), 94-97.

Pain, M. T. G., & Pain, M. A. (2005). Essay: Risk taking in sport. *Medicine and Sport, 366*, 533-534.

Pakkari, J., Kujala, U. M., & Kannus, P. (2001). Is it possible to prevent sports injuries? Review of controlled clinical trials and recommendations for future work. *Sports Medicine, 31*, 985-995.

Parkin, P. C., & Hu, X. (1995a). Evaluation of a subsidy program to increase bicycle helmet use by children of low-income families. *Pediatrics, 96*(2 (Pt 1)), 283-287.

Parkin, P. C., & Hu, X. (1995b). Evaluation of a subsidy program to increase bicycle helmet use by children of low-income families. *Pediatrics, 112*(2 (pt 1)), 283-287.

Pender, N. J., Murdaugh, C. J., & Parsons, M. A. (2002). *Health Promotion in Nursing Practice* (4th ed.). Upper Saddle River, NJ: Prentice Hall.

Perkins, H. W. (1997). College student misperceptions of alchol and other drug norms among peers: Exploring causes, consequences and implications. In H. W. Perkins (Ed.), *Designing Alcohol and Other Drug Prevention Programs in Higher Education: Bringing Theory into Practice.* (pp. 292). Newton, MA: The Higher Education Center for Alcohol and Health.

Pett, M. A., Lackey, N. R., & Sullivan, J. J. (2003). *Making sense of factor analysis.* Thousand Oaks, CA: Sage Publications, Inc.

Pickett, W., Garner, M. J., Boyce, W. F., & King, M. A. (2002). Gradients in risk for youth injury associated with multiple risk behaviours: A study of 11,329 Canadian adolescents. *Social Science & Medicine, 55*, 1055-1068.

Polit, D. F., Beck, C. T., & Hungler, B., P. (2001). *Essentials of Nursing Research: Methods, Appraisal, and Utilization.* (5th ed.). Philadelphia: J. B. Lippincott.

Powell, J. W. (2001). Cerebral concussion: Causes, effects and risks in sports. *Journal of Athletic Training, 36*(3), 307-311.

Prall, J. A., Winston, K. R., & Brennon, R. (1995). Severe snowboarding injuries. *Injury, 26*, 539-542.

Proschaska, J. O., DiClemente, C. C., & Norcross, J. C. (1994). *Changing For Good: A Revolutionary Six-stage Program for Overcoming Bad Habits and Moving Your Life Positively Forward.* New York: Avon.

Proschaska, J. O., Redding, C. A., & Evers, K. (1997). The transtheoretical model and stages of change. In K. Glanz, F. M. Lewis & B. K. Rimer (Eds.), *Health Behavior and Health Education: Theory, Research, and Practice* (2nd ed.). San Francisco: Jossey-Bass.

Ray, J. J.Forced-choice fallacies and an alternative measure of sensation-seeking. Retrieved January 5, 2005, 2005, from www.jonjayray.batcave.net/zuck.html

Ray, J. J. (ND). Forced-choice fallacies and an alternative measure of sensation-seeking. Retrieved January 5, 2005, 2005, from www.jonjayray.batcave.net/zuck.html

Rees-Jones, A. (1999). Skiing helmets. *British Journal of Sports Medicine, 33*(1), 3.

RiskPsychology.net. (2004). Risk Education: Risk Preferences: Personality Models. Retrieved July 14, 2004, from www.riskpsychology.net

Robinson, M. V. (2003a). *Brief synthesis of bicycle helmet literature to identify commonly cited barriers to helmet wear.*Unpublished manuscript, OHSU, Portland OR.

Robinson, M. V. (2003b). *Evidence Review of Snow-Sport Sensation Seeking.*Unpublished manuscript, Portland, Oregon.

Rodgers, G., B. (1996). Bicycle Helmet use patterns among children. *Pediatrics, 97*(2), 166-174.

Rogers, E. M. (1995). *Diffusion of Innovations*. New York, NY: The Free Press.

Rohrmann, B. (2002). *Risk attitude scales: concepts and questionnaires.* Melbourne, Australia: University of Melbourne.

Rohrmann, B. (2005). Validity and Reliability Statistics for ROQ and RMQ. In M. V. Robinson (Ed.) (pp. e-mail). Tacoma, WA.

Rolison, M. R., & Scherman, A. (2002). Factors influencing adolescents' decisons to engage in risk-taking behavior. *Adolescence, 37*(147), 585-596.

Rollnick, S., Mason, P., & Butler, C. (1999). *Health Behavior Change: A Guide for Practitioners.* London: Churchill Livingstone.

Ronning, R., Gerner, T., & Engebretsen, L. (2000). Risk of injury during alpine and telemark skiing and snowboarding. The equipment-specific distance-correlated injury index. *The American Journal of Sports Medicine, 28*(4), 506-508.

Rosenbloom, T. (2003). Risk evaluation and risky behavior of high and low sensation seekers. *Social Behavior and Personality, 31*(4), 375-386.

Rossi, B., & Cereatti, L. (1993). Sensation seeking in mountain athletes as assessed by Zuckerman's sensation seeking scale. *International Journal of Sport Psychology, 24*, 417-431.

Sacco, D., Sartorelli, D., & Vane, D. (1998). Evaluation of alpine skiing and snowboarding injury in a northeastern state. *The Journal of Trauma, 44*(4), 654-659.

Sandowlowski, M. (2000). Whatever happened to qualitative description? *Research in Nursing & Health, 23*, 334-340.

Schrader, M. P., & Wann, D. L. (1999). High risk recreation: The relationship between participant characteristics and degree of involvement. *Journal of Sport Behavior, 22*(3), 426-441.

Seibel, C. A., & Dowd, E. T. (1999). Reactance and therapeutic noncompliance. *Cognitive Therapy and Research, 23*(4), 273-379.

Shealy, J., Ettlinger, C., & Johnson, R. (2005). How fast do winter sports participants travel on alpine slopes? *Journal of ATSM International, 2*(7), 0.

Shealy, J., Johnson, R. J., & Ettlinger, C. (1997, Spring). *Helmets for recreational skiers and snowboarders: an idea whose time has come?* Paper presented at the XII International Congress on Skiing and Trauma Safety, Whistler, B.C.

Shealy, J. E. (1993). *Snowboard vs. downhill skiing injuries.* Paper presented at the Skiing Trauma and Safety: Ninth International Symposium, ASTM STP 1182, Philadelphia.

Shorter, N. A., Mooney, D. P., & Harmon, B. J. (1999). Snowboarding injuries in children and adolescents. *The American Journal of Emergency Medicine, 17*(3), 261-263.

Simoneau, G., & Shaffer, H. J. (2004, 4/3/2004). What if there was no denial: Some thoughts on substance use and abuse. Retrieved 30 May, 2004, from http://www.harboroaks.com/display_article.asp?article=2643

Slanger, E., & Rudestam, K. E. (1997). Motivation and disinhibition in high risk sports: Sensation seeking and self-efficacy. *Journal of Research in Personality, 31*, 355-374.

Sleet, D., & Gielen, A. C. (1998). Injury Prevention. In S. S. Gorin & J. Arnold (Eds.), *Health Promotion Handbook.* St. Louis, MO: Mosby.

Smelser, N. J. (1998). The rational and the ambivalent in the social sciences: 1997 presidential address. *American Sociological Review, 63*(1), 1-15.

Smith, R. E., Ptacek, J. T., & Smoll, F. (1992). Sensation seeking, stress, and adolescent injuries: a test of stress-buffering, risk-taking, and coping skills hypothesis. *Journal of Personality and Social Psychology, 62*(6), 1016-1024.

Spear, L. P. (2000). Neurobehavioral changes in adolescence. *Current Directions in Psychological Science, 9*(4), 111-114.

Stewart, D. W., & Shamdasani, P. N. (1990). *Focus Groups Theory and Practice* (Vol. 20). Newbury Park, CA: Sage Publications, Inc.

Susman, E. J., Inoff-Germain, G., Nottelmann, E. D., Loriaux, D. L., Cutler, G. B., & Chrousos, G. P. (1987). Hormones, emotional disposition, and aggressive attributes in young adolescents. *Child Development, 58*, 1114-1134.

Sweeting, H., & West, P. (2003). Young people's leisure and risk-taking behaviours: changes in gender patterning in the west of Scotland during the 1990's. *Journal of Youth Studies, 6*(4), 391-412.

Tashakkori, A., & Teddlie, C. (Eds.). (2003). *Handbook of mixed methods in social & behavioral research.* Thousand Oaks, CA: Sage Publications, Inc.

Theun, F. (1994). Injury-related behaviors and sensation seeking: An empirical study of a group of 14-year-old Norwegian school schildren. *Health Education Research, 9*, 465-472.

Thompson, D., Rivara, F., & Thompson, R. (2002). Helmets for preventing head and facial injuries in bicyclists. *Cochran Databases of Systematic Reviews (online), 2002*(4), {no page #].

Thompson, N. J., Sleet, D., & Sacks, J. J. (2002). Increasing the use of bicycle helmets: lessons from behavioral science. *Patient Education and Counseling, 46*(3), 191-197.

Thurmond, V. A. (2001). The point of triangulation. *Journal of Nursing Scholarship, 33*(3), 253-258.

Thygerson, A. L. (1986). *Safety* (2nd ed.). Englewood Cliffs, New Jersey: Prentice-Hall.

Turner, C., McClure, R., & Priozzo, S. (2002). Injury and risk-taking behavior--a systematic review. *Accident Analysis & Prevention, 36*(2004), 93-101.

Tursz, A. (2000). Adolescents' Risk-taking behavior, myth or reality: Evidence from international data. In D. Mohan & G. Tiwari (Eds.), *Injury Prevention and Control* (pp. 149-165). New York: Taylor & Francis.

USCPSC, U. C. P. S. C. (1999). *Skiing helmets: an evaluation of the potential to reduce head injury.* Washington, DC: US Government Printing Office.

USFS --United States Forest Service. (2003, April 15, 2003). Fire Shelters and Risk Compensation. Retrieved July 31, 2004, 2004, from www.fs.fed.us/fire/safety/shelter/0351-2804_RiskComp/htm03512804/page02.htm

Van Mechelen, W., Twisk, J., Molendijk, A., Blom, B., Snel, J., & Kemper, H. C. (1996). Subject related risk factors for sports injuries: a 1 year prospective sutdy in young adults. *Medical Science Sports and Exercise, 28*(1171-9).

Van Noordennen, P. (2005, March/April). Head Games. *SKIING,* 86.

Wankel, L., & Berger, B. (1990). The psychological and social benefits of sport and physical activity. *Journal of Leisure Research, 22*, 167-182.

Weber, J., & Jaksche, H. (1999). Craniocerebral trauma in sports: with recommendations for prevention. *Sportverletz Sportschaden, 13*(1), 30-35.

Westbury, T., Pates, J., & Maynard, I. (2001). Sensation seeking and sport-related risk appraisal. *Journal of Sport Sciences, 19*(8), 658-659.

Whitehead, D., & Russell, G. (2004). How effective are health education programmes--resistance, reactance, rationality and risk? Recommendations for effective practice. *International Journal of Nursing Studies, 41*, 163-172.

Wilde, G. J. S. (2001). *Target Risk 2* (2nd ed.). electronic book: pde@drivers.com.

Wilde, G. J. S., & Robertson, L. S. (2002). Does risk homoeostasis theory have implications for road safety. *British Medical Journal, 324*, 1149-1152.

Williamson, G. R. (2005). Illustrating triangulation in mixed-methods nursing research. *Nurse Researcher, 12*(4), 7-18.

Wolpert, L. (1996). *Risk*: National Institute for Medical Research.

Xiang, H., Kelleher, K., Shields, B., Brown, K., & Smith, G. A. (2005). Skiing and Snobarding-Related Injuries Treated in U.S. Emergency Departments, 2002. *Journal of Trauma: Injury, Infection, and Critical Care, 58*(1), 112-118.

Xiang, H., Stallones, L., & Smith, G. A. (2004). Downhill skiing injury fatalities among children. *Injury Prevention, 10*, 99-102.

Yates, J. F. (1992). *Risk-taking Behavior*. New York: Wiley.

Zalenski, Z. (1983). Sensation-seeking and risk-taking behavior. *Personality & Individual Differences, 5*(5), 607-608.

Zuckerman, M. (1983). Sensation-seeking and sports. *Personality & Individual Differences, 4*, 285-293.

Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking*. New York: Cambridge Press.

Zuckerman, M., Eyseneck, S., & Eyseneck, H. J. (1978). Sensation seeking in England and America: cross-cultural, age and sex comparisons. *Journal of Consulting and Clinical Psychology, 46*, 149-149.

Zuckerman, M., & Kuhlman, D. M. (2000). Personality and risk-taking: Common biosocial factors. *Journal of Personality Special Issue, 68*(8), 999-1029A.

Zuckerman, M., & Neeb, M. (1980). Demographic influences in sensation seeking and expressions of sensation seeking in religion, smoking and driving habits. *Personality & Individual Differences, 1*, 197-206.

Appendix A

ROQ Risk Orientation Questionnaire

ATTITUDES TOWARD RISK DECISIONS

ROHRMANN 1997 Version #3

The following sentences describe how various people deal with risky situations and what their *attitude toward risk decisions* is. We would like to learn how you think about these issues. Could you please read each sentence and then rate to what extent that statement is true for you. For your answers, a seven point scale is provided:

True for me

no, not at all ***yes, very much so***

1 – 2 – 3 – 4 – 5 – 6 – 7

> > Please circle the number which best reflects your view!

RA I'm quite cautious when I make plans and when I act on them 1 2 3 4 5 6 7

RB I follow the motto, "nothing ventured, nothing gained" 1 2 3 4 5 6 7

RC I've not much sympathy for adventouous decisions 1 2 3 4 5 6 7

RD If a task seems interesting, I'll choose to do it even if I'm not Sure whether I'll manage it 1 2 3 4 5 6 7

RE I don't like to put something at stake, I would rather be on he safe side. 1 2 3 4 5 6 7

RF Even I know that my chances are limited, I try my luck 1 2 3 4 5 6 7

RG In my work, I only set small goals so that I can achieve Them without difficulty 1 2 3 4 5 6 7

RH I express my opinion even if most people have opposite views 1 2 3 4 5 6 7

RI My decisions are always made carefully and accurately 1 2 3 4 5 6 7

RJ I would like to act in my boss's job some time so as to demonstrate my competence, despite the risk of making mistakes 1 2 3 4 5 6 7

RX I tend to imagine the unfavorable outcomes of my actions 1 2 3 4 5 6 7

RY Success makes me take higher risks 1 2 3 4 5 6 7

Appendix B

RMQ Risk Motivation Questionnaire

B. Rohrmann & T. Davison
Version #7 University of Melbourne, Dept of Psychology

This questionnaire deals with the reasons why people take part in activities which have an element of risk. Of interest are the considerations and motivations why may influence you decide to engage (or not) in a potentially dangerous activity.

Part PA and PS

PA #1 Participating in sports such as **skiing or snowboarding**.....

Please try to remember why you take part in this activity. Using the following scale, rate how relevant each of the following factors were for your decision to engage in this activity.

This factor influenced my decision to take part in this activity....

1----------2----------3----------4----------5

not at all a little moderately quite a bit very much

Please circle the number which best reflects your experience and attitude

1.	Satisfaction of seeking new experiences	1	2	3	4	5
2.	For fun/amusement	1	2	3	4	5
3.	Curiosity about what the activity is like	1	2	3	4	5
4.	To increase self-confidence	1	2	3	4	5
5.	Feeling of having control over something	1	2	3	4	5
6.	Wanting to overcome my inner fears	1	2	3	4	5
7.	Enhancing my view of self (as brave, adventurous, skilled)	1	2	3	4	5
8.	Personal challenge (opportunity to test my own limits)	1	2	3	4	5
9.	Relief from the monotony of everyday life	1	2	3	4	5
10.	For excitement and thrill	1	2	3	4	5
11.	Enjoyment of the "adrenaline rush"	1	2	3	4	5
12.	Tendency to live life "on the edge"	1	2	3	4	5
13.	To enjoy "being at risk"	1	2	3	4	5

14. For physical pleasure, such as pleasant body feelings	1	2	3	4	5
15. To experience unique sensations (sound, touch, taste, smell)	1	2	3	4	5
16. To prove myself to others	1	2	3	4	5
17. To attract attention	1	2	3	4	5
18. Rebelling a little against authority figures or society	1	2	3	4	5
19. To take part in something with others and to be sociable	1	2	3	4	5
20. Pressure from others to take part in the activity	1	2	3	4	5
21. So as not to look like a coward	1	2	3	4	5
22. Everyone else was doing this, so I trusted it's OK	1	2	3	4	5
23. Activity is familiar (much experience with it)	1	2	3	4	5
24. Relying on effectiveness of my equipment	1	2	3	4	5
25. Too inexperienced to imagine the potential risks	1	2	3	4	5
26. Activity not judged as dangerous	1	2	3	4	5
27. Underestimated the severity of consequences	1	2	3	4	5
28. Spur of the moment decision (no thought of risks)	1	2	3	4	5
29. Because my safety and health are not that important	1	2	3	4	5
30. Alcohol consumption beforehand	1	2	3	4	5
31. The future is too bleak to worry that much about my life	1	2	3	4	5
32. Other factors _____	1	2	3	4	5
_____	1	2	3	4	5

Appendix C

SENSATION SEEKING SCALE

Version V

M. Zuckerman 1978

DIRECTIONS: Each of the items below contains two choices, A and B. Please indicate on your answer sheet which of the choices most describes your likes or the way you feel. In some cases, you may find items in which both choices describe your likes or feelings. Please choose the one which better describes your likes or feelings. In some cases YOU may find items in which you do not like either choice. I those cases, mark the choice you dislike least. Do not leave any items blank.

It is important you respond to all items with only one choice, A or B. We are interested in your like or feelings, not in how others feel about these things or how one is supposed to feel. There are no right or wrong answers as in other kinds of tests. Be frank and give your honest appraisal of yourself. Answers are kept secret and confidential.

Circle
A or B

1. A. I like "wild" uninhibited parties.
   B. I prefer quiet parties with good conversation.

2. A. There are some movies I enjoy seeing a second or even a third time.
   B. I can't stand watching a movie that I've seen before.

3. A. I often wish I could be a mountain climber.
   B. I can't understand people who risk their necks climbing mountains.

4. A. I dislike all body odors.
   B. I like some of the earthy body smells.

5. A. I get bored seeing the same old faces.
   B. I like the comfortable familiarity of everyday friends.

6. A. I like to explore a strange city or section of town by myself, even if it means getting lost.
   B. I prefer a guide when I am in a place I don't know well.

7. A. I dislike people who do or say things just to shock or upset others.
   B. When you can predict almost everything a person will do and say he or she must be a bore.

8. A. I usually don't enjoy a movie or play where I can predict what will happen in advance.

B. I don't mind watching a movie or play where I can predict what will happen in advance.

9. A. I have tried marijuana or would like to.
B. I would never smoke marijuana.

10. A. I would not like to try any drug which might produce strange and unusual effects on me.
B. I would like to try some of the drugs that produce hallucinations.

11. A. A sensible person avoids activities that are dangerous.
B. I sometimes like to do things that are a little frightening.

12. A. I dislike "swingers" (people who are uninhibited and free about sex)
B. I enjoy the company of real "singers".

13. A. I find that stimulants make me uncomfortable.
B. I often like to get high (drinking liquor or taking marijuana or drugs).

14. A. I like to try new foods that I have never tasted before.
B. I order the dishes with which I am familiar, so as to avoid disappointment and unpleasantness.

15. A. I enjoy looking at home movies or travel slides.
B. Looking at someone's home movies or travel slides bores me tremendously.

16. A. I would like to take up the sport of water skiing.
B. I would not like to take up the sport of water skiing.

17. A. I would like to try surfboard riding.
B. I would not like to try surfboard riding.

18, A. I would like to take off on a trip with no preplanned or definite routes, or timetable.
B. When I go on a trip, I like to plan my route and timetable fairly carefully.

19. A. I prefer the"down to earth" kinds of people as friends.
B. I would like to make friends in some of the "far out" groups like artists or "punks".

20. A. I would not like to learn to fly and airplane.
B. I would like to learn to fly an airplane.

21. A. I prefer the surface of the water to the depths of the deep.
B. I would like to go scuba diving.

22. A. I like to meet persons who are homosexual (men or women).
B. I stay away from anyone I suspect of being gay or lesbian.

23. A. I would like to try parachute jumping.
B. I would never want to try jumping out of a plane with or without a parachute.

24. A. I prefer friends who are excitingly unpredictable.
B. I prefer friends who are reliable and predictable.

25. A. I am not interested in experience for its own sake.
B. I like to have new and exciting experiences and sensations even if they are a little frightening, unconventional, or illegal.

26. A. The essence of good art is in its clarity, symmetry of form and hormony of colors.
B. I often find beauty in the clashing colors and irregular forms of modern paintings.

27. A. I enjoy spending time in the familiar surroundings of home.
B. I get very restless if I have to stay around home for any length of time.

28. A. I like to dive off the high board (at the pool).
B. I don't like the felling I get standing on the high board (or I do not go near it at all).

29. A. I like to date persons who are physically exciting.
B. I like to date persons who share my values.

30. A. Heavy drinking usually ruins a party because some people get loud and boisterous (rowdy).
B. keeping the drinks full is the key to a good party.

31. A. The worst social sin is to be rude.
B. The worst social sin is to be a bore.

32. A. A person should have considerable sexual experience before marriage.
B. It's better if two married persons begintheir sexual experience with each other.

33. A. Even if I had the money, I would not care to associate with "rich and famous"
B. I could conceive of myself seeking pleasures around the work with the "rich and famous".

34. A. I like people who are sharp and witty even if they do sometimes insult others.
B. I dislike people who have their funat the expense of furting the feelings of others.

35. A. There is altogether too much portrayal of sex in movies.
B. I enjoy watching many of the "sexy" scenes in movies.

36. A. I feel best after taking a couple of drinks.
B. Something is wrong with people who need liquor to feel good.

37. A. People should dress according to some standard of taste, neatness, and style.
B. People should dress in individual ways even if the effects are sometimes strange.

38. A. Sailing long distances in small sailing drafts is foolhardy.
B. I would like to sail a long distance in a small, but seaworthy sailing craft.

39, A. I have no patience with dull or boring persons.
B. I find something interesting in almost every person I talk to.

40. A. Skiing down a high mountain slope is a good way to end up on crutches.
B. I think I would enjoy the sensations of skiing very fast down a high mountain slope.

THANK YOU for being honest and answering ALL THE QUESTIONS

END of ALL PAPER and PENCIL FORMS for this Study
Please give to researcher and return for focus group sessions.

Appendix D

Focus Group Interview Guide

Introduce self
You've just finished a package of questionnaires about risk and risk taking. We will get to that as we go along. We are here today to talk about a real passion in our lives....skiing or snowboarding.

In order to do that we need to go over some rules of the day:
(only one person speaks at a time; speak loud enough for all to hear; remain in your seats; respect dissonant viewpoints; etc.)

This session is video taped so that the researcher can go over what you say and really listen to what you want to share; what your opinions truly are about this sport. There are no right or wrong answers. This is not a test. We just want to hear how you truly feel. Say what comes from your heart.

1. Warm Up: What's the best thing about skiing or boarding?

    a. Prompt: What draws you to it?
    b. Prompt: How does it compare to other sports?
    INTENT: seeking experiences & emotions

2. Some people say skiing or boarding are risky things to do. They say it's dangerous to strap something on your feet and go sliding around on the snow. Can you tell me more about that?

    a. Prompt: What about the sport makes it risky?
    b. Prompt: Why is that risky?
    c. Prompt: Is it always equally risky?
    d. Prompt: Is it riskier than other sports?
    INTENT: perception of risk; risk factors from their viewpoint

3. It is known that some skiers and riders make risky maneuvers while on the hill. What about you?

    a. Follow up: Do you go out of your way to take risks?
    b. Follow up: Do you have to take risks to have a great day skiing or boarding?
    c. What about your friends?
    INTENT: motivations toward risk

4. What about the chances of getting hurt?

    a. Have you ever been injured when skiing or riding? If so, was it related to doing something risky? Explain.
    b. Follow up: How has that changed what you do now?
    c. *If no one states they have been injured on the slopes*: How would getting injured change how you think about the risk of the sport or what you do on the slopes?

5. What about your own degree of risk while on the snow? Is it different than others? Why or why not?

    a. Prompt: Do you consider yourself to be a risk taker?
    INTENT: perception if self differs from others

    (this is a return to individual risk . I think after talking for a while they may be more open to being personal about the risks they take than earlier in the talk)

6. Some people say folks should wear helmets while skiing or riding. What do you think about that?

    a. Prompt: Have you always felt this way about helmets?
    b. Prompt: What about children? (If does not come up in the conversation)
    c. Prompt: Do the opinions of others influence your thoughts about wearing helmets? (i.e. parents, peers, teachers, patrollers)
    INTENT: particulars about helmets: whether reflects literature

7. Imagine yourself right now <u>wearing a helmet</u> and taking a great run on the slope. Tell me about what you would experience

    a. Prompt dependent upon answers: Would there be any GOOD/NEGATIVE aspects about wearing that helmet?
    b. Prompt: Would anything be different about the way you SKI/RIDE if you DID/DID NOT wear a helmet?
    c. If necessary: Do you think helmets make people do riskier things?
    INTENT: do helmets influence behavior on slopes

8. Has anything we discussed today changed your thinking about helmets?

9. Thank everyone for taking time out of their schedules for attending.

OREGON HEALTH & SCIENCE UNIVERSITY
Research Integrity Office, L106-RI (503) 494-7887

MEMO

Date: 8/10/2005

To: Catherine Salveson, MS ,PHD

From: Margaret Allee, RN, MS, JD, Chair, Institutional Review Board, L106-RI
Susan B. Bankowski, MS, JD, Co-Chair, Institutional Review Board, L106-RI
Gary T. Chiodo, DMD, FACD, Director, OHSU Research Integrity Office, L106-RI
Charlotte Shupert, PhD, Associate Director, Research Integrity Office, L106-RI

Subject: IRB00001483, Snow Sport Helmet Wear Barriers and Motivators: An Inquiry into a Link with Risk Taking

Initial Study Review
Protocol/Consent Form Approval

This memo also serves as confirmation that the OHSU IRB (FWA00000161) is in compliance with ICH-GCP codes 3.1-3.4 which outline: Responsibilities, Composition, Functions, and Operations, Procedures, and Records of the IRB.

This study is approved for 50 subjects.

Your protocol is approved for one year effective 08/12/05 .

Your consent forms are approved by the IRB effective 08/12/05 .
You may use only copies of the approved consent form for the informed consent process. The approved consent form can be found by logging on to the eIRB system and going to your study. Next, click on the Study Documents tab and locate your approved consent form under the Approved Documents heading.

The requirement to obtain Authorization is waived because the protocol does not involve the collection, use, or disclosure of PHI.

Other items reviewed and administratively approved by the IRB include: Demographics form, focus group narrative guide, surveys and scale.

This study met the criteria for EXPEDITED IRB review based on Category #7, where the research employs interview and survey methodologies.

Subjects must receive a copy of OHSU's Notice of Privacy Practices.

This approval may be revoked if the investigators fail to conduct the research in accordance with the guidelines found in the Roles and Responsibilities document (http://www.ohsu.edu/research/rda/rgc/randr.pdf). Please note that any proposed changes in key personnel must be submitted to the IRB via a Modification Request and approved prior to initiating the change. If you plan to discontinue your role as PI on this study or leave OHSU, you must arrange either (a) to terminate the study by so notifying the IRB and your department head, or (b) propose to transfer the responsibility of the PI to a new faculty member using a Modification Request.

Investigators must provide subjects with a copy of the consent form, keep a copy of the signed consent form with the research records, and place a signed copy in the patient's hospital/clinical medical record (if applicable).

OHSU **Oregon Health & Science University**
Consent Form

IRB#: e1483
Protocol Approval Date: 08/12/05

OREGON HEALTH & SCIENCE UNIVERSITY
Consent Form

TITLE: Snow Sport Helmet Wear Barriers and Motivators: An Inquiry into a Link with Risk Taking

PRINCIPAL INVESTIGATOR: Catherine Salveson PhD (503) 494-3558

CO-INVESTIGATORS: Marylou V. Robinson MSN (253) 535-7697
Susan Butterworth PhD (503) 494-3821
Merlin Simpson, DBA (253) 535--8779

SUPPORTED BY: The American Academy of Nurse Practitioners Foundation

PURPOSE:

"You" means you or your child in this consent form.

You have been invited to be in this research study because you are a recreational skier or snowboarder. The purpose of this study is to learn about the opinions and motivations of snow sport participants about risk and risking taking on the slopes.

This study involves one session lasting about three hours for both the paperwork and discussion parts of the study.

Each study session involves 8 to 12 people from ages 15-30. There will be about 50 total people in the study.

PROCEDURES:
After the initial paperwork, you will be given three different questionnaires to complete using a pencil. There are no right or wrong answers, just your opinion. After you are with are done with the written questions, you will make a nametag to wear for the discussion portion (focus group) of the study. The name you elect to use can be a nickname or short made up name such as "Flash" or "Joe"". This way, your real name will not be known to anyone who sees the video (unless you want to use your real name). A moderator will lead the discussion for about 60 to 90 minutes. Again, there is no right or wrong answer, only your true thoughts and opinions. At the end of the discussion, you will receive your reimbursement for participation.

People who have agreed for this study are grouped to represent a cross section of the types of skiers and snowboarders we want to talk to. This includes a mix of young people up to age 30 from both genders.

The type of questions asked in the written portion of the study deal with risk and risk taking. These surveys are not specific to skiing or snowboarding, but used for many studies about risk. The first written questionnaire is one page long. The second one is only two. The last one appears longer with 40 questions, but goes fast because it only asks for a yes or no answer. The types of questions range from what you would do in a situation to how you feel about a subject. Risk taking and risky behavior questions generally include things such as driving fast, smoking, drug use, unsafe sex, and gambling. You may elect not to answer any question.

The questions deal with issues that might be found embarrassing or create personal discomfort. These topics include unsafe sex, use of drugs and feelings toward other people.

It is study policy that parents will not be present in the room when students under age 18 take the surveys or speak in the discussion groups. Parents will not be provided copies of the answers provided by their child, nor be informed on how their child responded in general to these questions. Parents will not be given transcripts of the sessions, nor have access to the video tapes. This policy is to maintain privacy and confidentiality for the student. It also allows the student to feel free to voice their true opinion, not the opinion they believe they are expected to have by adults.

It is study policy that parents will not be present in the room when students under age 18 take the surveys or speak in the discussion groups. Parents will not be provided copies of the answers provided by their child, nor be informed on how their child responded in general to these questions. Parents will not be given transcripts of the sessions, nor have access to the video tapes. This policy is to maintain privacy and confidentiality for the student. It also allows the student to feel free to voice their true opinion, not the opinion they believe they are expected to have by adults.

These tapes are will be used to analyze the responses of the group. You will not be able to review the entire tape, nor any possible video images taken from the film. Such images maybe used to help demonstrate a point in a future presentation to other researchers, students or audiences in scientific meetings. They will not be used for commercial purposes or profit.

If you have any questions regarding this study now or in the future, contact Marylou Robinson (253) 535-7697.

RISKS AND DISCOMFORTS:

There are no reasonably foreseeable risks or inconveniences expected because of participating in this study other than the possible personal discomfort associated with answering questions of a personal nature or the highly unlikely event of you being recognized by someone in a class or scientific meeting where portions of the films might be shown.

Questions only ask opinion and preferences You may refuse to answer any of the questions that you do not wish to answer.

You will pick a short name to use as an alias or nickname such as "Flash" or "Joe Cool". This way you can remain anonymous and protect your identity, but can be called upon by the moderator or others in the group. Your real name will not be revealed to anyone in the group, nor in the future.

BENEFITS:

You may or may not personally benefit from being in this study. However, by serving as a participant, you may help us learn how to better understand skiers and snowboarders in the future.

ALTERNATIVES:

You may choose not to be in this study or withdraw at any time.

CONFIDENTIALITY:

We will not use your name or your identity for publication or publicity purposes.

Research records may be reviewed and/or copied by the sponsor, the OHSU Institutional Review Board, and the Office for Human Research Protections (OHRP).

Under Oregon and Washington Law, suspected child or elder abuse must be reported to appropriate authorities.

Your name will not be associated with your survey responses or your discussion statements when the findings of the study are published. Every effort will be made to secure your identity to include: separate of personal data sheets from the questionnaire forms or results and the videotapes.

Video tapes are intended primarily for research analysis purposes. Short segments might be used in the future in a class or research discussion. Efforts will be made to conceal identities. It is understood that the use of the nickname or alias may still enable others to recognize you.

The recordings will be transcribed into paper format for research analysis of what is said. The videotape may be used to help clarify specific comments made. The comments will not be linked back to your real name.

The tapes will not be stored with the transcripts. Entire video tapes will be stored up to ten (10) years after the conclusion of data collection in a secure location with limited access. The tapes will then be destroyed.

COSTS:

There are no costs to the participants except for the time expended in the sessions.

Participants are compensated for their time and contributions with a $25.00 award at the end of the oral discussions. It the participant withdraws before the end of the study this amount is $5.00 for completion of the written forms only.

You will not be paid for the use of the video images or audiotape remarks.

LIABILITY:

If you believe you have been injured or harmed while participating in this research and require immediate treatment, contact Marylou Robinson who will be on site.

It is not the policy of the U.S. Department of Health and Human Services, or any federal agency funding the research project in which you are participating, to compensate or provide medical treatment for human subjects in the event the research results in physical injury.

The Oregon Health & Science University is subject to the Oregon Tort Claims Act (ORS 30.260 through 30.300). If you suffer any injury and damage from this research project through the fault of the University, its officers or employees, you have the right to bring legal action against the University to recover the damage done to you subject to the limitations and conditions of the Oregon Tort Claims Act. You have not waived your legal rights by signing this form. For clarification on this subject, or if you have further questions, please call the OHSU Research Integrity Office at (503) 494-7887.

PARTICIPATION:

If you have any questions regarding your rights as a research subject, you may contact the OHSU Research Integrity Office at (503) 494-7887.

You do not have to join this or any research study. If you do join, and later change your mind, you may quit at any time. If you refuse to join or withdraw early from the study, there will be no penalty or loss of any benefits to which you are otherwise entitled.

You may be removed from the study if you do not follow instructions, are disrespectful of others and their opinions, or voice credible threats to others present.

The participation of OHSU students or employees in OHSU research is completely voluntary and you are free to choose not to serve as a research subject in this protocol for any reason. If you do elect to participate in this study, you may withdraw from the study at any time without affecting your relationship with OHSU, the investigator, the investigator's department, or your grade in any course.

Students from any other school or university also participate voluntarily and may withdraw from the study at any time without affecting your relationships with the investigator or causing a drop in your grade in any course.

We will give you a copy of this form.

SIGNATURES:

Your signature below indicates that you have read this entire form and that you agree to be in this study.

Signature of the participant
(includes minor under age 18)

Date

Signature of parent or legal guardian of participants under 18 AND date

relationship

Signature of person obtaining consent

IRB# 1483
Protocol Approval Date: 08/12/2005

OREGON HEALTH & SCIENCE UNIVERSITY
Child Assent Form
(Use for children ages 7 through 17)

TITLE: Snow Sport Helmet Wear Barriers and Motivators: An Inquiry into a Link with Risk Taking

PRINCIPAL INVESTIGATOR: Catherine Salveson PhD (503) 494-3558

CO-INVESTIGATOR: Marylou V. Robinson MSN (253) 535-7697

SUPPORTED BY: The American Academy of Nurse Practitioners Foundation

Part I

An investigator listed above has explained this research study to me. I know how it may or may not help me. I also know that this study will help doctors know more about risk taking.

1. The investigator will ask me to explain what I will do and what will happen in this study to be sure I understand the study.

2. The investigator will ask me if I have any questions or want to know anything else about this study or about risk taking.

3. The investigator will ask me to explain some of the good and bad things that might happen to me if I enter this study.

Part II

I have thought about being a part of this study. I have asked and received answers to my questions. I agree to be in this study. I know that I don=t have to agree to be in the study. Even though I agree to be in it now, I know I may feel differently later on and can ask to stop being in the study. I know that I may talk with my parents and/or doctor about not being in this study at any time.

Name/signature:_____ Date:_____

Document Control No.: IRB-CAS-01
Original Date: 12/04/2002; Revision Date: 02/10/2004

Appendix H

Demographics

Name:_____ Email:
DATE_____

Age: years _____

PLEASE CHECK APPROPRIATE ANSWER
Gender: female ____ male ____

Snow Equipment *Used Most Often*: skis _____ OR snowboard _____

How often do you use a helmet when skiing or riding?
100%_____ 75%_____ 50%_____ 25%_____ Never _____
Is this your choice?

How often you do ski or ride? 1-3 times a year _____
4-10 times a year _____
More than 10 times _____

How long have you been skiing and/or riding in total?
1-3 years ____
4-9 years ____
10 or more years _____

Education: Still in high school _____ High School Graduate _____
GED _____ Some College _____
College graduate _____ Some graduate school _____

Which local winter resort is your favorite? _____
Which local winter resort do you go to most often? _____

Have you ever had a concussion or head injury while skiing or boarding?
_____

CODE: 123XYZ **Moniker selected for discussion group:**
_____

Appendix H

Demographics

Name:_____ Email:
DATE_____

Age: years _____

PLEASE CHECK APPROPRIATE ANSWER
Gender: female ____ male ____

Snow Equipment *Used Most Often*: skis _____ OR snowboard _____

How often do you use a helmet when skiing or riding?
100%_____ 75%_____ 50%_____ 25%_____ Never _____
Is this your choice?

How often you do ski or ride? 1-3 times a year _____
4-10 times a year _____
More than 10 times _____

How long have you been skiing and/or riding in total?
1-3 years ____
4-9 years ____
10 or more years _____

Education: Still in high school _____ High School Graduate _____
GED _____ Some College _____
College graduate _____ Some graduate school _____

Which local winter resort is your favorite? _____
Which local winter resort do you go to most often? _____

Have you ever had a concussion or head injury while skiing or boarding?
_____

CODE: 123XYZ **Moniker selected for discussion group:**
_____

OREGON HEALTH & SCIENCE UNIVERSITY ***MEMO***

Research Integrity Office, L106-RI (503) 494-7887

Date: March 16, 2006

To: Catherine Salveson, PhD

From:
Margaret Allee, RN, MS, JD, Chair, Institutional Review Board, L106-RI
Susan B. Bankowski, MS, JD, Co-Chair, Institutional Review Board, L106-RI
Gary T. Chiodo, DMD, FACD, Director, OHSU Research Integrity Office, L106-RI
Charlotte Shupert, PhD, Associate Director, Research Integrity Office, L106-RI

Subject: IRB00001483, Snow Sport Helmet Wear Barriers and Motivators: An Inquiry into a Link with Risk Taking
Modification ID#: MR00002061, Modification Title: Consent Form Revision

Modification Request Approval Communication

re: Removal of Focus Groups from the Consent Form

* This study's current IRB approval lapses on 08/11/2006.

Your Modification Request resubmitted 03/16/2006 was reviewed and administratively approved by the IRB on 3/16/2006.

Items reviewed and administratively approved with this modification request include: Consent Form.

An Assent Form for minors aged 7 - 17 has been created and approved at this review.

You may use only copies of the uploaded approved consent and assent forms for the informed consent process.