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Translation of a Ski School Sun Safety Program to North American Ski and Snowboard Schools

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Abstract

Unprotected and excessive exposure to ultraviolet radiation is the primary risk factor for skin cancer. Promoting sun safety practices to children and adolescents who recreate outdoors has the potential to reduce skin cancer occurrence later in life. Go Sun Smart (GSS), a sun safety program for employees and guests of ski areas was distributed to determine if an enhanced dissemination strategy was more effective than a basic dissemination strategy at reaching parents at ski and snowboard schools. On-site observations of GSS use and surveys of 909 parents/caregivers with children enrolled in ski and snowboard schools were conducted and analyzed using techniques for clustered designs. No differences were identified by dissemination strategy. Greater implementation of GSS was associated with greater parental recall of materials but not greater sun protection practices. Greater recall of messages, regardless of level of implementation, resulted in greater sun protection practices for children. GSS effectiveness trial's favorable findings may have been successfully translated to ski and snowboard school across the North American ski industry. Ski areas that used more of the program materials appeared to reach parents with sun safety advice and thus convinced them to take more precautions for their children. Sun safety need not be at odds with children's outdoor recreation activities.

Keywords

Sun safety; physical activity; implementation; campaign; dissemination

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Introduction

Skin cancer is the most common type of cancer in the United States with melanoma and non-melanoma skin cancer rates increasing annually (American Cancer Society, 2013). Unprotected and excessive exposure to ultraviolet radiation (UVR) is the primary risk factor for skin cancer; one quarter of lifetime exposure to UVR occurs before the age of twenty. Children and teenagers receive more exposure to UVR in the first two decades of life than do adults over the next four (Godar, Urbach, Gasparro, & van der Leun, 2003; Green, Wallingford, & McBride, 2011). The cumulative effects of early UVR exposure make the need for sun safe practices among children and adolescents especially significant (Olson et al., 2007). A routine of sun safe practices, including using broad-spectrum sunscreen and wearing UV protected eyewear and clothing, adopted during childhood and adolescence could prevent the occurrence of skin cancer in later life (Centers for Disease Control and Prevention, 2002; Centers for Disease Control and Prevention, 2003).

A number of programs designed to promote sun safe behaviors among children and adolescents are currently in place. They include policy recommendations from governmental agencies and active health communication campaigns administered in settings ranging from public schools to community wide clinics and recreational venues (Community Preventive Services Task Force, 2002). Yet, in spite of these systematic prevention efforts, children and adolescents continue to be at risk for later life skin cancer as a result of sunburning and excessive UVR exposure in their formative years (Cokkinides et al., 2006; Geller et al., 2002).

Concurrently, public health recommendations include increasing the level of physical activity in which children and adolescents routinely engage (Centers for Disease Control and Prevention, 2011). Physical activities that occur outside when risk from excessive solar UVR, the primary cause of skin cancer, is at its daily peak are often advocated. Outdoor sports and recreation have been identified as risk factors for UVR-induced skin cancers (Adams, 2002; Crane et al., 2012; Moehrle, 2008); many adults experience severe sun exposure and report low levels of sun protection during recreation and leisure activities (Dozier S & Wagner R, 1997; Ting S, 2003).

A primary location for outdoor, winter sports, physical activity at ski areas attract millions of children and adolescents each year. In 2012/2013, there were 56.6 million skier or snowboarder days at US ski areas (Hawks, 2013) and 24% of skiers were under eighteen (Physical Activity Council & Snowsports Industries of America, 2012). Thus, approximately 11–14 million skier days are spent by children resulting in substantial potential UVR exposure due to high altitude and substantial reflectivity from the snow (Andersen et al., 2010).

This study was conducted in a novel and challenging venue where children are both encouraged to recreate outdoors and also are at risk from high levels of UVR exposure and possible sunburning from the midday sun: North American Ski Schools. It is based on the authors' previous research conducted at 26 North American ski areas in the effort to encourage sun safe behaviors among ski area personnel and guests, including the parents of

children and adolescents enrolled in ski and snowboard schools (Buller et al., 2005; Walkosz et al., 2007; Walkosz et al., 2008). The design intended to meet two challenges. The first involved the competing need to not interfere with the adoption of a skill set (skiing/snowboarding) that potentially could lead to a lifetime commitment to outdoor recreation and its attendant health benefits while, at the same time, adopting a corollary set of sun safe behaviors to minimize the risk of skin cancer. The second challenge was to determine the degree to which the favorable results from the first study translated to an industry-wide effort to promote sun safe behaviors among ski area personnel and their guests.

Initial Effectiveness Trial

The Go Sun Smart (GSS) effectiveness trial was a communication theory-based intervention designed to persuade ski area employees and guests to adopt a sun safe routine to reduce exposure to excessive UVR and consequent sun burning. Promotional communication was developed to reach and influence employees and guests, including parents of children enrolled in ski schools. The trial consisted of 26 pair-matched ski areas. The intervention areas received a mix of text and graphic messages that consistently advocated wearing sunscreen, sun protective eyewear and a hat; ski and snowboard schools received messages specifically designed to urge school personnel and parents to “sun proof their kids,” and scripts for ski area personnel to recommend sun safe behavior to guests. The GSS’ program had beneficial effects on ski area guests, including children in ski and snowboard schools (Walkosz et al., 2008; Walkosz et al., 2007).

GSS Dissemination Trial

Based on the findings in the effectiveness trial, a large-scale dissemination trial with members of the National Ski Areas Association (NSAA) was designed and implemented. The latter is the primary organization representing North American ski areas, including the distribution of industry-wide educational programs intended to benefit association members.

The current study posited that an Enhanced Dissemination Strategy developed for GSS will be more effective than the industry standard or a Basic Dissemination Strategy at a) reaching parents at ski and snowboard schools with messages promoting sun protection of children (i.e., message recall) and b) improving children’s sun safety. Further, greater implementation of GSS by ski areas will be associated with a) greater parental recall of sun protection messages at ski and snowboard schools and b) greater sun protection for children (i.e. a dose-response effect).

Methods

Dissemination Strategies

Two dissemination strategies were compared and tested. The Basic Dissemination Strategy (BDS) was comprised of normal dissemination strategies of NSAA to distribute safety programs to its members, and was used to distribute GSS to the 369 NSAA member ski areas; it then served as the comparison condition. Information regarding GSS was distributed at industry trade shows, in NSAA’s newsletter, and on its website. Free kits with small numbers of GSS materials, a 1-page tip sheet, and a packing list with information on

intended audiences for GSS items were also mailed twice a year over three ski seasons to all member ski areas.

Drawing upon Diffusion of Innovation Theory (Rogers, 2003), the “Enhanced Dissemination Strategy” (EDS) augmented the BDS with printed materials and face-to-face contact between project staff and ski areas’ senior managers. The primary focus of the EDS was to achieve implementation fidelity, as it was essential in gaining the benefits of GSS as witnessed in the effectiveness trial (Buller et al., 2005). Analyses in that trial showed a clear exposure (i.e., dose-response) effect with improved sun safety practices for guests (and employees) at ski areas that implemented more GSS materials (Buller et al., 2005; Walkosz et al., 2007; Walkosz et al., 2008). Printed materials distributed in the EDS: a) established the need for sun protection at ski areas; b) described each GSS item, its intended audience and principle of influence, c) addressed common misconceptions related to the program expressed by managers, and d) listed key implementation steps. Project staff visited managers at each ski area once early in the season and then maintained monthly contact by email and telephone through the season. Communication during these contacts was intended to stress the need for sun safety, reduce managers’ uncertainty about GSS by highlighting its fit with area operations, help them plan for program use, obtain commitment to use GSS, and deliver continued support for program implementation (Buller et al., 2012; Rogers, 2003).

Experimental Design

A randomized posttest-only design was used to evaluate the dissemination strategies on parents’ exposure to sun protection messages and sun protection for their children. Ski areas were randomized to either the BDS or EDS. Randomization was generated using a SAS program with a random seed by the biostatistician who is remote from the intervention sites and interventionists. Randomization was done to randomize pairs based on matching criteria previously identified with best match resorts randomly assigned to intervention or control with a 50/50 probability. It was concealed from the intervention teams until the activation was required since initiation of the intervention could not be blinded from the resort. The ski areas were located in Arizona, California, Colorado, Idaho, Maine, Montana, Pennsylvania, New Hampshire, New Mexico, New York, Oregon, South Dakota, Utah, Vermont, Virginia, Washington, West Virginia and British Columbia. The size ranged from small single operators to areas managed by large multi-area corporations. Eligible ski areas were defined as those with a) two or more aerial chair lifts with ride times of at least five minutes (to interview guests); b) 100 or more employees (to survey at least 50 employees); c) summit elevation of 2500 feet or higher (to have increased UVR levels); and d) a full-time general manager or equivalent (for ski area recruitment).

In 2004–2006, of 129 eligible ski areas, 69 were recruited in three waves (n=28 in 2004, n=20 in 2005, and n=21 in 2006) to participate; 1 ski area was eliminated due to a lack of snow and 5 resorts did not provide ski school data either because of weather or lack of participants at data collection. All ski areas in each wave received GSS through the BDS and half of the ski areas in each wave were randomly assigned to the EDS (n=12 in 2004, n=11 in 2005, and n=10 in 2006). The EDS occurred during the ski season when areas were

recruited to the trial, from November to April; effects of the EDS on program implementation and employee sun protection are reported elsewhere (Buller et al., 2012). On-site observations of GSS use and surveys of parents of children enrolled in ski and snowboard schools were performed by project staff during the ski season. The interview protocol and survey developed originally in the effectiveness trial on GSS were employed (Walkosz et al., 2007). Respondents were approached while they waited to pick up their children from the ski/snowboard school and asked to participate in a brief survey on sun protection for their children. They were read an introduction and consent statement, approved by the Institutional Review Boards, which requested that they volunteer for a brief, anonymous survey on sun protection. Researchers first asked the parent how many children were enrolled in the ski/snowboard school. If only one child was enrolled, parents were asked about sun safety practices for that child. If more than one child was enrolled, they were asked about the child with the most recent birthday. Parents were also asked about their exposure to sun safety messages at the ski area and were given a lip balm to thank them for their participation.

Sample

The sample consisted of 909 parents/caregivers of children enrolled in ski and snowboard schools at 63 ski areas that participated in the dissemination program.

Eligible respondents were parents or caregivers of children enrolled in the ski and snowboard schools on data collection days and 18 years of age or older. On a few occasions, the person picking up the child was not the parent (e.g., grandparent); this person was interviewed if they had dropped off the child at the school. Project staff attempted to interview a minimum of 10 parents at each ski area but the final sample size was a matter of convenience based on the number of children enrolled and weather conditions.

Measures

Observation of GSS—GSS printed materials, as well as any non-GSS sun protection messages (e.g., advertising or resort messaging) were recorded with on-site observations by trained project staff, using a protocol from the effectiveness trial (Buller et al., 2005). Printed GSS materials included 15 posters/signs, 3 brochures, 2 static clings and 1 logo magnet. For each material recorded, staff noted whether it was in areas accessible only to employees (e.g., offices, locker rooms, garages, etc.) or in guest areas. The observational measure was validated by independent blinded observers who visited the ski areas a week before the scheduled visit by project staff (Buller et al., 2012).

Parent/Caregiver Survey—Parents with children enrolled in ski and snowboard school completed questions assessing the number of children enrolled, sun protection of one of their children while in the school that day (whether wearing sunscreen; a sunscreen lip balm; sunglasses or goggles; and a hat or a helmet), and age and gender of the child. Respondents were also asked if before enrolling their children in the ski school if they had been verbally informed by a ski resort employee about providing sunscreen, sunglasses, or goggles or a hat or if they had seen any messages or information about sun safety practices at the ski area.

Researchers also visually assessed the parent's sex and race/ethnicity and recorded the date and time of the interview and current weather conditions.

Statistical Analyses

Parents' exposure to sun safety messages, reported as recall, and sun protection behavior reported for children were compared by dissemination condition and evaluated in a stepwise fashion. First, the number of GSS messages observed in use and its relationship with message recall was examined, using signal detection techniques in a Receiver Operator Curve (ROC) analysis procedure and ignoring dissemination strategy condition. Two groups of ski areas were identified based on number of GSS materials, with the threshold being the level of GSS use associated with the most change in message recall. Next, ski areas were post-stratified into these high v. low program use groups using this threshold and children's sun protection was compared between these groups. Finally, sun protection practices for children were compared between parents who did and did not recall receiving a sun protection while at the ski areas.

All analyses were conducted at the individual parent level and adjusted for clustering of guests within ski areas as assessed by the intra-class correlation (Murray D, 1998), using PROC MIXED in SAS and an alpha criterion of 0.05 (two-tailed). We included in the analysis the year ski areas participated in the trial (i.e., wave) plus the hours of sunshine per year for the resort and all covariates that demonstrated statistically-significant bivariate correlations with the outcome measures.

Results

Profile of the Sample

909 parents completed the interview with 11 (1.2%) declining (Table 1). Most parents were female and non-Hispanic White. The children on whom parents reported were equally split between males and females and most (82.4%) were under age 11. One in 10 children had been sunburned while skiing, snowboarding, or recreating at a ski area.

Effect of Dissemination Strategy

The prediction that the use of EDS to distribute GSS would be more effective than the industry-standard BDS at a) reaching parents with sun safety message and b) influencing the sun protection of their children was not supported. Parents with children in ski and snowboard school did not show a difference in their recall of sun protection messages at the ski areas by dissemination strategy condition (Table 2). Also, sun protection of their child in the ski and snowboard school was not different by dissemination strategy condition (Table 2).

Effect of Program Implementation

Greater implementation of GSS by ski areas was associated with greater parental recall of materials at ski and snowboard schools. The ROC analysis showed that parents recalled more sun protection messages at the ski and snowboard school when 5 or more GSS materials were observed in use in guest-accessible areas. More than twice as many parents

(36.6% vs. 16.7%) recalled receiving a message in the high-use group of ski areas compared to in the low-use group (Table 3).

However, greater implementation of GSS did not result in greater sun protection for children at ski and snowboard schools. Sun protection practices for children reported by parents did not differ between high-use and low-use ski areas. Instead, greater exposure to sun protection messages at the ski areas was associated with improved sun protection of children, regardless of the amount of GSS implementation (Table 3). More parents who recalled seeing a sun protection message at the ski areas reported applying sunscreen ($P<0.05$) and sunscreen lip balm (ns) to their children, providing them with sunglasses and goggles ($p<0.01$), and more use of all sun protection practices for their children ($p<0.01$).

Discussion

This study suggests that the GSS effectiveness trial's favorable findings may have been successfully translated to ski and snowboard school across the North American ski industry by managers who took full advantage of the GSS materials. Neither the basic nor the enhanced strategy for disseminating GSS was more successful than the other at improving sun protection for children. However, ski areas that took steps to use more of the program materials appeared to reach parents with sun safety advice and in doing so convince them to take more precautions for their children. Parents recalled seeing more sun safety messages at ski areas where personnel implemented 5 or more GSS materials than at ski areas that used less of the program. In turn, parents who recalled seeing a sun safety message reported practicing more sun protection for their children than parents who did not recall receiving a message.

Sun protection campaigns directed to children and adolescents have met with some success (Buller, Loescher, & Buller, 1994; Buller et al., 2006; Buller & Borland, 1999; Kyle et al., 2008; Milne et al., 2000), as have programs implemented in recreation venues (Dietrich et al., 1998; Glanz, Geller, Shigaki, Maddock, & Isnec, 2002; Parrott et al., 1999), Sun safety advice has also been successfully included in programs associated with teaching outdoor recreation skills within aquatic education settings (Glanz et al., 2002). Parents (and children) may be amenable to receiving advice on sun safety skills as part of learning outdoor sports and this could help ensure that sun protection is a routine, life-long practice for children who recreate outdoors. A key factor that has been identified for program success includes the need to take the necessary steps to insure that audiences have adequate and sufficient exposure to program messages (Hornik & Kelly, 2007; Wakefield, Loken, & Hornik, 2010).

The limitations to this study include the possibility that parents may have seen GSS materials at other ski areas during the season. Although we did not control for this, we can learn how information is disseminated and how programs are implemented in a large recreation industry. The second limitation is the use of self-report data. However, approximately 50% of parents reported low levels of sun protection, and these levels are somewhat consistent with research that reports levels of sun protection for children (Buller & Borland, 1999). Further, parental report measures are a feasible method for assessing UV exposure and sun protection practices for children (Mayer et al., 1997). These results

underscore the opportunities that exist for sun safety promotion for children in recreational settings.

Conclusions

Our findings imply that sun safe behaviors need not be at odds with the outdoor recreational pursuits of children. Health communication campaigns designers that address reducing the risks of environmental agents such as UV need to be mindful of how their campaign is perceived by the consumer, specifically how it may appear to make recommendations that conflict with other health advice they are receiving. The experience of the GSS trials indicates that a sun safety campaign can be framed to reconcile competing advice and provide information and skills to remain sun safe when while obtaining the benefit of outdoor recreation in the context of skiing and snowboarding.

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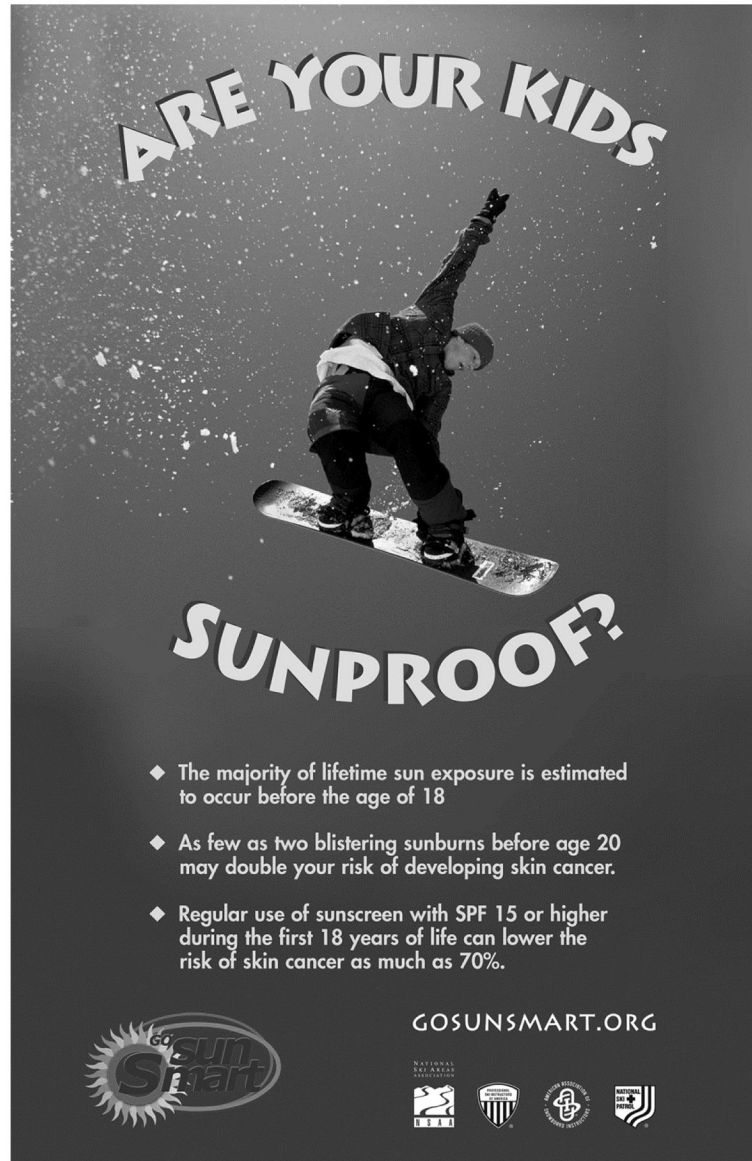


FIGURE 1.
Go Sun Smart Poster for Ski and Snowboard Schools

Table 1

Profile of sample of participating parents with children in ski school at posttest (n=909)

Characteristics	%
Age of Child Enrolled in Ski School (Mean = 7.6, Std dev = 3.0):	
2–5	27.3
6–10	55.1
11–14	15.7
15–18	1.8
19–22	0.1
Child's Gender:	
Male	50.8
Female	49.2
Relationship to Child:	
Not parent	4.4
Parent	95.6
Parent/Guardian's Gender:	
Male	37.1
Female	62.9
Parent/Guardian's Observed Race:	
American Indian/Alaska Native/First Nations	0.5
Asian	4.2
Black/African American	0.8
Hispanic/Latino	3.2
Native Hawaiian/Other Pacific Islander	0.3
White	90.5
Mixed race	0.5
Child Ever Been Sunburned While Skiing This Winter:	
No	89.4
Yes	10.6

Table 2

Differences in exposure to *Go Sun Smart* program and sun protection behaviors for children reported by parents between Basic and Enhanced Dissemination Strategy conditions

Variable	Dissemination Strategy		p ¹
	Basic n=477	Enhanced n=432	
<i>Exposure to Go Sun Smart</i>			
Did you see any message or information about providing sunscreen, sunglasses or goggles, or a hat for this child at this ski school or ski area day care facility?	23.6%	24.8%	0.80
Before enrolling this child in this ski school or day care facility today, were you verbally informed by a ski area employee about providing sunscreen, sunglasses or goggles, or a hat for your child?	18.7%	21.1%	0.52
SUN PROTECTION BEHAVIORS FOR CHILD			
Applied SPF 15+ sunscreen on the skin	44.4%	44.7%	0.96
Applied sunscreen lip balm	28.4%	27.8%	0.86
Had sunglasses or goggles for skiing, snowboarding, or playing outside at the ski school or day care facility	86.8%	81.3%	0.12
Had a hat for skiing, snowboarding, or playing outside at the ski school or day care facility	46.2%	48.6%	0.75
Overall sun protection ² (mean, std error)	2.04 (0.07)	1.99 (0.08)	0.65

¹ alpha criterion set at 0.05 (two-tailed)

² Sum of wearing SPF 15+ sunscreen, wearing SPF 15+ lip balm, wearing sunglasses/goggles, and having hat (range=0 to 4). Analysis was adjusted for year ski areas participated in the trial (i.e., wave) and hours of sunshine per year for the resort.

Table 3
Differences in exposure to *Go Sun Smart* program and sun protection behaviors for children by parents with children enrolled in ski and snowboard school by number of *Go Sun Smart* materials observed in use in guest-accessible areas and recall of sun protection messages

VARIABLE	Number of <i>Go Sun Smart</i> materials observed in use in guest-accessible areas		Recalled a sun protection message	
	4 items n=507	5 items n=402	Not recalled n=657	Recalled n=252
Exposure to <i>Go Sun Smart</i>				
Did you see any message or information about providing sunscreen, sunglasses or goggles, or a hat for this child at this ski school or ski area day care facility?	16.7%	36.8% **		
Before enrolling this child in this ski school or day care facility today, were you verbally informed by a ski area employee about providing sunscreen, sunglasses or goggles, or a hat for your child?	17.2%	24.5%		
Sun Protection Behaviors				
Applied SPF 15+ sunscreen on the skin	45.9%	47.8%	42.9%	50.9% *
Applied sunscreen lip balm	31.0%	28.0%	26.2%	32.8%
Had sunglasses or goggles for skiing, snowboarding, or playing outside at the ski school or day care facility	87.5%	84.5%	82.3%	89.6% **
Had a hat for skiing, snowboarding, or playing outside at the ski school or day care facility	46.6%	48.2%	47.4%	47.3%
Overall sun protection ¹ (mean, std error)	2.08 (0.08)	2.06 (0.09)	1.97 (0.07)	2.17 (0.08) **

* p<0.05 (two-tailed);

** p<0.01

¹ Sum of wearing SPF 15+ sunscreen, wearing SPF 15+ lip balm, wearing sunglasses/goggles, and having hat (range=0 to 4).