

Social Marketing Quarterly

<http://smq.sagepub.com/>

Use of Health Communication and Social Marketing Principles in Planning Occupational Safety and Health Interventions

Virginia H. Sublet and Max R. Lum
Social Marketing Quarterly 2008 14: 45
DOI: 10.1080/15245000802542061

The online version of this article can be found at:
<http://smq.sagepub.com/content/14/4/45>

Published by:



<http://www.sagepublications.com>

On behalf of:



FHI360

Additional services and information for *Social Marketing Quarterly* can be found at:

Email Alerts: <http://smq.sagepub.com/cgi/alerts>

Subscriptions: <http://smq.sagepub.com/subscriptions>

Reprints: <http://www.sagepub.com/journalsReprints.nav>

Permissions: <http://www.sagepub.com/journalsPermissions.nav>

Citations: <http://smq.sagepub.com/content/14/4/45.refs.html>

>> [Version of Record](#) - Dec 1, 2008

[What is This?](#)

Use of Health Communication and Social Marketing Principles in Planning Occupational Safety and Health Interventions



BY VIRGINIA H. SUBLET AND MAX R. LUM

ABSTRACT

This study reviewed health communication and social marketing designs used in occupational safety and health interventions over the last 15 years in the United States. After an extensive literature review, 50 studies were identified that self-reported use of health communication and/or social marketing principles and practices to design occupational safety interventions. Nineteen of these studies were selected for analysis based on the following factors: the inclusion of a behavioral theory, strong study design, an intervention was conducted, and an evaluation was completed. Results indicated that all of the interventions met the criteria to be classified as a health communication intervention, but none met the complete criteria to be considered a true social marketing intervention. Limitations in the evaluation designs made it difficult to assess the impact of these interventions; however, results suggest that health communication principles have been applied widely, while social marketing techniques are poorly understood and underutilized in planning occupational safety programs.

Introduction

On average nearly 16 workers die each day in the United States due to workplace injuries, and 134 die from work-related diseases. Daily, an estimated 11,500

This article not subject to United States copyright law.

private sector workers suffer non-fatal injuries, and as a result, more than half require a job transfer, work restrictions, or time away from their jobs. Approximately 9,000 are treated in emergency departments each day due to occupational injuries, and approximately 200 are hospitalized. In 2004, workers' compensation costs were \$87 billion (National Institute for Occupational Safety and Health [NIOSH] 2008).

The mission of NIOSH is to provide national and world leadership to prevent work-related illness, injury, disability, and death of workers by collecting information, conducting research, and translating the knowledge gained into products and services. As part of this mission, NIOSH has embarked on an initiative to improve the translation of research findings, technologies, and recommendations into occupational safety and health practice. Known as "Research to Practice" (r2p), this endeavor uses NIOSH research findings to develop and disseminate effective products and work place practices, and to evaluate the effectiveness of these efforts in improving worker health and safety. During the last 15 years, NIOSH has turned to the communication sciences, and more recently to social marketing, for principles and techniques to improve the r2p process.

As part of an effort to evaluate and improve NIOSH's r2p initiative, this study reviewed the application of health communication (HC) and social marketing (SM) strategies in designing occupational safety and health interventions between 1993 and 2007. Specific objectives were to: (1) describe the use of HC and SM principles and practices to develop occupational safety and health program interventions, and (2) examine the reported impact of these interventions.

Health Communication and Social Marketing Approaches

For purposes of this study, HC is defined as "the study and use of communication strategies to inform and influence individual and community decisions that enhance health" (National Cancer Institute 2002, 2).

Evidence-based health communication is defined as HC interventions based on good scientific principles including objectives, theoretical basis, proven state-of-the-art-methods, analysis, and evaluation. These elements are increasingly recognized as necessary for all HC efforts to improve health, as evidenced by the inclusion of a health communication focus area in *Healthy People 2010* (U.S. Department of Health and Human Services 2000). The importance of these principles, especially the availability of evaluation data to assess effectiveness, is now widely recognized as essential for dissemination of applied research (Kreps 2002; Rogers 1994; Sharf 1999).

SM is a planning framework that “applies commercial marketing technologies to the analysis, planning, execution, and evaluation of programs to improve the personal welfare of intended populations” (Andreasen 1995). SM is often used when information dissemination alone is insufficient to bring about behavior change and a more satisfying exchange must be created, disseminated, and delivered. It is distinguished from other planning frameworks by its steadfast *consumer orientation* and use of formative research to understand consumer wants and needs, careful *audience segmentation*, reliance on a comprehensive, *integrated marketing mix* (product, pricing, placement, and promotional strategies) and application of the *exchange and competition concepts* to achieve *behavioral goals* (National Social Marketing Centre 2008). In this study, interventions were categorized as SM if they incorporated these principles into their planning activities.

Methods

A variety of methods were used to identify studies that employed HC and SM principles to design occupational safety and health interventions to protect American workers. First, a NIOSH librarian trained in occupational safety and health conducted computer searches of numerous databases for articles published between 1993 and 2007. These databases, summarized in Table 1, identified abstracts that included one or more of the following search terms: health communication, social marketing, diffusion of innovations, risk communication, intervention research, communication research, NIOSH industrial sectors, occupational health, safety interventions, occupational health and safety prevention, campaigns, interventions for workers, and risk communication. Second, articles referenced in the materials identified in the electronic databases were reviewed to determine if they had used health communication and/or social marketing principles and techniques in their design. Third, the authors sought advice from occupational health and safety experts about other articles that were not available in the electronic database searched during the initial step. These experts included scientists working at NIOSH, NIOSH-funded Educational Resource Centers and Agricultural Centers, and other academic institutions.

The investigators examined over a thousand abstracts. A majority of the abstracts eliminated from further consideration dealt with workplace health promotion rather than health prevention, had not been published in a peer-reviewed journal, or did not describe the implementation of an intervention. The remaining articles were assessed for strength of design, theoretical basis, intervention approach, and evaluation. The authors selected 19 studies for analysis based on their reliance on a theoretical framework, use of study design methodology, completion of an intervention, and some kind

TABLE 1

Databases Used in Searching for Occupational Safety and Health Communication Interventions

COMPUTER SEARCHES OF DIFFERENT DATABASES CONDUCTED BY THE NIOSH LIBRARY COVERING U.S. AND INTERNATIONAL CITATIONS

The Databases Searched Included:

- Hseline, which contains around 250,000 references to worldwide information covering all aspects of occupational safety and health. Approximately 1,000 additions are made each year.
- CISILO, a bilingual, bibliographic database which provides references to international occupational health and safety literature. The database was created by the International Occupational Safety and Health Information Centre/Centre international d'informations de sécurité et d'hygiène du travail (CIS) in Geneva.
- OSHLINE NIOSHTIC[®] is a bibliographic database which provides comprehensive international coverage of documents on occupational health and safety, as well as related fields. It contains detailed summaries of over 200,000 articles, reports and publications, spanning over 100 years. OSHLINE[®] continues the coverage of the NIOSHTIC[®] database which provided comprehensive coverage of OSH Literature until 1998. OSHLINE[®] is a bibliographic database providing up-to-date references to published international OSH-related literature. It includes summaries of peer-reviewed articles, research reports, conference proceedings, and textbooks. It is produced by the Canadian Center of Occupational Health and Safety (CCOHS). OSHLINE[®] is available exclusively from CCOHS. NIOSHTIC[®] is a bibliographic database which provides comprehensive international coverage of documents on occupational health and safety, as well as related fields. It contains detailed summaries of over 200,000 articles, reports and publications, spanning over 100 years. NIOSHTIC-2 is a bibliographic collection featuring NIOSH published or sponsored reports.
- PUB Med was developed by the National Library of Medicine and provides free access to MEDLINE. This database includes citations and abstracts in the fields of medicine, nursing, dentistry, veterinary medicine, health care systems, and preclinical sciences.
- Web of Science provides seamless access to current and retrospective multidisciplinary information from approximately 8,700 of the most prestigious, high-impact research journals in the world.
- Science Direct, which offers more than a quarter of the world's scientific, medical, and technical information online.
- NORA Impacts Document, which includes all of the projects funded by NIOSH.

(Continued)

TABLE 1

Continued

COMPUTER SEARCHES OF DIFFERENT DATABASES CONDUCTED BY THE NIOSH LIBRARY COVERING US AND INTERNATIONAL CITATIONS.

- PsycInfo Database, which collects psychological and related disciplines of behavior literature from 1987 to the present.
- Embase, a comprehensive bibliographic database that covers the worldwide literature on biomedical and pharmaceutical fields.
- CINAHL (Cumulative Index to Nursing & Allied Health Literature[®]) was originally a print index to the literature of nursing and eventually allied health information. The CINAHL[®] database has emerged as a comprehensive and versatile guide to an exploding body of knowledge, and now extends beyond the limits of a bibliographic print index.
- The Cochrane Collaboration of Occupational Health Citations, a database of 847 evidenced based occupational health resources.

of evaluation. The authors considered these four criteria the most important for evidence-based communication interventions in the field of occupational safety and health. The use of a theoretical framework was included as a criterion to explain target group behavior and suggest mechanisms to achieve behavior change. Study design was a significant component as the more rigorous the study design, the more confidence can be taken in the validity of the resulting estimate of intervention effects. The studies also had to include a well-described intervention (some positive action to help workers to improve their health by reducing exposure, injury, disease, or death). Evaluation was an important criterion because comparing outcome data was imperative for determining intervention effectiveness.

Results

Seventeen occupational health and safety studies declared the use of HC principles in designing program strategies and materials. Of these, all met the criteria to be considered evidence-based HC interventions. In contrast, only two studies professed using SM to design their program intervention, and neither of these met the benchmark criteria established by the National Centre for Social Marketing in the United Kingdom to be considered a social marketing program (National Centre for Social Marketing 2008).

These interventions are summarized in Table 2, noting the planning framework (HC or SM) that the authors reported using, the theoretical framework guiding the intervention, and key elements of the program intervention.

TABLE 2

Studies by Sector, Author, Population, Planning Framework, Theory/Model, Intervention, Evaluation Design, and Outcome

STUDY	PLANNING FRAMEWORK AUTHORS CLAIMED TO USE (HC, SM ¹)	THEORY OR MODEL	INTERVENTION	EVALUATION DESIGN	OUTCOME (DID THE INTERVENTION SUCCEED?)
Sector: Agriculture, Forestry, and Fishing					
Chapman et al. (2004)	HC	Diffusion of Innovation Theory (Rogers 2003)	The purpose was to disseminate information to convince small vegetable growers to adopt mesh bags and standard containers that aid in crop handling and reduce musculoskeletal disease.	Design: Randomized – No Control/Comparison – Yes, Convenience Sample Treatment Groups – 1 Pre and post – Yes	Behavior change achieved. There was an increase in the use of standard containers from 38% to 54%, and for mesh bags from 8% to 16.9%. Awareness of information about standard containers at public events increased from 33% to 49% and mesh bags in trade journals increased from 38% to 57%
Population: Vegetable growers			<i>Channels</i> – trade publications, public events, University Extension, and other growers		

Chapman et al. (2003)	SM	Diffusion of Innovations Theory (Rogers 2003), Social Marketing Planning Model (Andreasen 1995)	The purpose was to increase voluntary adoption of safer production practices and also more profitable: barn lights, bag silos, and a mixing site for calf feed. Channels – print mass media, public events, University Extension, and dairy farmers using the practices	Design: Randomized – No Control/Comparison – No Treatment Groups – 1 Pre and post – Yes	Limited behavior change. There was a non-significant increase in adoption of barn lights (12% vs. 23%), silo lights (41% vs. 43%) and calf feed mixing site (7% vs. 10%). There was a significant increase in awareness. Self-reported data. Possible reporting bias. Lack of statistical power. No random sampling or controls.
Kidd et al. (2003)	HC	Trans theoretical Model of Change (Prochaska, DiClement, and Norcross 1992)	The purpose was to determine if adolescents could be moved from thinking about change to action. Participants given narrative and injury simulations on amputation, spinal cord injuries, hypersensitivity pneumonitis and noise induced hearing loss. Channel – simulation	Design: Randomized – Yes Control/Comparison – Yes Treatment Groups – 2 Pre and post – Yes Follow-up – Observation	Positive behavior change in moving students from contemplation to action.
Population: Adolescents in Farming					
<p>Note. HC = Health Communication. SM = Social Marketing.</p>					

(Continued)

TABLE 2

Continued

STUDY	PLANNING FRAMEWORK AUTHORS CLAIMED TO USE (HC, SM ¹)	THEORY OR MODEL	INTERVENTION	EVALUATION DESIGN	OUTCOME (DID THE INTERVENTION SUCCEED?)
Martenga et al. (2002) Population: Farmers	HC	Transtheoretical Model of Change (Procheska et al. 1992)	The purpose was to compare the efficacy of standard and multiphased dissemination approaches to encourage parents to use the North American Guidelines for Children's Agricultural Tasks for assigning children jobs on the farm. <i>Channel</i> – mail	Design: Randomized – Yes Control/Comparison – Yes Treatment Groups – 1 Pre and Post – Yes. Post at 6 and 15 months	Investigators reported behavior and knowledge change.
Elkind et al. (2002) Population: Hispanic farm workers	HC	Social or Observation Learning Theory (Bandura 1977)	The purpose was to increase the knowledge of Hispanic workers about occupational safety and health using four one-act Spanish plays about farm safety and health: (1) disease and prevention, (2) ergonomics, (3) Hepatitis A, (4) pesticide safety. <i>Channel</i> – theater	Design: Randomized – No Control/Comparison – No Treatment groups – 1 Pre and post – Yes	Some behavior change and increased knowledge retained at two months after intervention.

Morgan et al. (2002)	HC	Extended Parallel Process Model (Witte, Meyer, and Martell 2001), Narrative Theory (Bal, 1997)	The purpose was to evaluate the different kinds of messages that were used in the Kentucky Community Partners for Healthy Farming project. <i>Channel</i> – print	Design: Randomized – No Control/Comparison – No Treatment groups – 1 Post Only	No behavior change assessed in this study. The authors indicated that the findings support the literature. Narrative messages better received than information messages. Conducted in one state. No qualitative input.
Rodriguez et al. (1997)	HC	Causal Model of Farm Safety Behavior (Daniels 1993)	The purpose was to evaluate the impact of the Safe Farm public health communication campaign produced by Iowa State University Extension. Farm safety messages were made available to 104,000 full-time and part-time Iowa farm operators and families. <i>Channels</i> – recorded PSAs on Iowa radio stations, media releases, print	Design: Randomized – No Control/Comparison – No Treatment groups – 1 Pre and post – yes	Significant improvements in behavior, awareness, concern noted. Positive changes probably could not be statistically attributed to campaign. Several indicators used were considered to have serious shortcomings as measures of effectiveness.

Note. HC = Health Communication. SM = Social Marketing.

(Continued)

TABLE 2

Continued

STUDY	PLANNING FRAMEWORK AUTHORS CLAIMED TO USE (HC, SM*)	THEORY OR MODEL	INTERVENTION	EVALUATION DESIGN	OUTCOME (DID THE INTERVENTION SUCCEED?)
Sector: Construction					
Inman and Blaciforti (2003) Population: Carpenters	HC	Theory of Planned Behavior (Fishbein and Ajzen 1975)	The purpose was to improve eye protection behavior in construction workers. Channels – stickers, messages on neck straps, tool box talks, posters, incentives	Design: Randomized – No Control/Comparison – Yes Treatment groups – 2 Pre and post – Yes, plus observation	Positive behavior change reported. Workers needed control, reminders, and incentives to wear protective eye protection. Observed data different from self-reported data. No main effect for both behaviors.
Lusk et al. (1999) Population: Construction workers	HC	Pender Health Promotion Model (Pender 1996)	The purpose was to promote the use of hearing protection devices in construction workers. Channels – video, hands-on practice, handouts, samples of hearing protection devices	Design: Solomon Four Group Design Randomized – Yes Control/Comparison – Yes Treatment Groups – 1 Pre and post – Yes	Short term increase in the use of hearing protection. General message used. Young workers not concerned about hearing loss. Used one-time intervention.

Sector: Healthcare and Social Assistance

Keller et al. (2005)	SM	Not Available	The purpose was to increase the knowledge of nurses doing direct care in hospitals about the importance of using safety practices when working with hepatitis C patients. Formative research was conducted to assess the knowledge of nurses about hepatitis C using focus groups, social networks, and an advisory council before developing the intervention. Six fact sheets containing information were sent to nurses.	Design Randomized – Yes Control/Comparison – No Treatment groups – 1 Pre and post – Yes	Campaign had little impact. Used a social marketing firm to develop and implement campaign. Used a single channel. Campaign needed better targeting to the important group. Need for multilevel approach pointed out by authors.
Sinclair et al. (2002)	HC	Diffusion of Innovations Theory (Rogers 2003)	The purpose was to evaluate the impact of information in the NIOSH Alert Preventing Needlesticks in Healthcare Facilities on the adoption of safe needlestick policies and procedures by U.S. hospitals.	Design: Randomized – Yes Control/Comparison – No Treatment groups – 1 Post – Yes	Cost, size of hospital and legislation had biggest impact on whether hospitals engaged in safety practices. Behavior change not assessed.
Population: U.S. Hospital			<i>Channel</i> – mail		

Note. HC = Health Communication. SM = Social Marketing.

(Continued)

TABLE 2

Continued

STUDY	PLANNING FRAMEWORK AUTHORS CLAIMED TO USE (HC, SM*)	THEORY OR MODEL	INTERVENTION	EVALUATION DESIGN	OUTCOME (DID THE INTERVENTION SUCCEED?)
Maxfield et al. (2000) Population: U.S. Hospital	HC	Diffusion of Innovations Theory (Rogers 2003)	The purpose was to evaluate NIOSH Alert Preventing Allergic Reactions to Natural Rubber Latex in the Workplace. Channel – mail	Design: Randomized – Yes Control/Comparison – Yes Treatment groups – 1 Post – Yes	Behavior change not assessed. About 50% of hospitals were supportive of adopting changes regarding latex allergy and worker protection. Low response rate. Unclear whether the mail channel was successful in creating successful advocates.
Sector: Manufacturing					
Lusk et al. (2003) Population: Factory workers	HC	Pender Model of Health Promotion (Pender 1996), Social Cognitive Theory (Bandura 1986)	The purpose was to use an individually tailored multimedia message intervention to increase the use of hearing protection devices in factory workers. Channel – computer, print	Design: Randomized – Yes Control/Comparison – Yes Treatment groups – 2 Pre and Post – Yes	There was a statistically significant behavior change in the use of hearing protection in those receiving the tailored interventions from pre – to post-evaluation but this was self-reported data. Substantiation of effect length not assessed.

Tan-Wilhelm et al. (2000)	HC	Theory of Reasoned Action (Ajzen 1995), Elaboration Likelihood Model (Petty and Cacioppo 1986), Protective Motivation Theory (Rogers 1975)	The purpose was to assess the effectiveness of a worker notification program at a beryllium machining plant and the influence of different communication media.	Design: Randomized – Yes Control/Comparison – Yes Treatment groups – 1 Post – Yes	Positive behavior change. Also knowledge was increased. Could not use a true controlled study because of ethical concerns. Data self-reported. Cannot determine the long-term effect. Concern about the need for repetitive interventions to sustain effects. Post-test only.
Sector: Mining					
Stephenson, et al. (2005)	HC	Persuasion Theory (McGuire 1984)	The purpose was to prevent or reduce hearing loss in coal miners by sending different messages to coal miners to increase their use of hearing protection.	Design: Randomized – Yes Control/Comparison – Yes Treatment groups – 3 Post – Yes	Behavior change not assessed. Positive and neutral messages most effective among miners. Low response rate to mailing. Single-item measures used for intentions, perceived manipulation, and message distortion.
Sector: Services					
Booth-Butterfield et al. (2007)	HC	Persuasion Theory (McGuire 1984), Elaboration Likelihood Model (Petty and Cacioppo 1986), Communication Matrix (Lindsay and Aronson 1985)	The purpose was to determine how to make NIOSH Alerts for firefighters most effective using different formats, raphics, argument quality, and mailer types.	Design: Randomized – Yes Control/Comparison – No Treatment groups – 1 Post – Yes	Behavior change not measured. Mail thought to be ineffective channel. Low graphics better received.

Note. HC = Health Communication, SM = Social Marketing.

(Continued)

TABLE 2

Continued

STUDY	PLANNING FRAMEWORK AUTHORS CLAIMED TO USE (HC, SM*)	THEORY OR MODEL	INTERVENTION	EVALUATION DESIGN	OUTCOME (DID THE INTERVENTION SUCCEED?)
Welbourne and Booth-Butterfield (2005) Populations: Firefighters	HC	Theory of Planned Behavior (Fishbein and Ajzen 1975), Persuasion Theory (McGuire 1984)	The purpose was to evaluate NIOSH Alert <i>Preventing Injuries and Deaths of Fire Fighters due to Structural Collapse</i> Channel – mail	Design: Randomized – Yes Control/Comparison – No Treatment groups – 1 Post – yes	Behavior change not measured. Impact was weak on recall, exposure, and action stages. The authors did not think the mail channel was effective. Need better processing of message to have a positive impact on attitudes.

Buller et al. (2005)	HC	Diffusion of Innovations Theory (Rogers 2003)	The purpose was to reduce sunlight exposure and possible skin cancer in outdoor employees at ski areas. Focus groups and in-depth interviews were used to develop messages.	Design: Randomized – Yes Control/Comparison – Yes Treatment groups – 1 Pre and post – Yes	Behavior change and awareness increase reported. Many channels used. More exposure to messages resulted in less sunburn in workers. Self-reported data, seasonal workers, participants with above-average education may have biased the results. Campaign short because of limited season in ski resorts.
Sector: No Sector Identified					
Hazard et al. (2000)	HC	Transtheoretical Model of Change (Prochaska et al. 1992)	The purpose was to evaluate a pamphlet to improve recovery in terms of pain, work status, and healthcare utilization after occupational low back injury.	Design: Randomized – Yes Control/Comparison – Yes Treatment groups – 1 Post – Yes	No significant impact. Authors not sure why there was no difference between the control and treatment groups.
Population: Workers filing a back-related First Report of Injury			<i>Channels</i> – posters, brochures, window and bathroom signs, training, email, newspaper articles, logo signs, decals, buttons, water bottles, and table tent <i>Channels</i> – mail		
<i>Note.</i> HC = Health Communication. SM = Social Marketing.					

The studies are organized by industrial sector. These sectors are part of the National Occupational Research Agenda (NORA) developed by NIOSH as a strategic planning mechanism for research in occupational safety and health. NORA is organized by eight industrial sectors: Agriculture, Forestry, and Fishing; Construction; Healthcare and Social Assistance; Manufacturing; Mining; Services; Wholesale and Retail Trade; and Transportation, Warehousing, and Utilities. The sector designations are based on the North American Industry Classification System. For more information, please visit <http://www.cdc.gov/niosh/nora/>.

As seen in Table 2, seven of the nineteen interventions were designed for the Agriculture, Forestry, and Fishing Sector; three for Services Sector; and three for the Healthcare and Social Assistance Sector. Two interventions addressed issues in the Construction Sector, two in the Manufacturing Sector, and one in the Mining Sector. One study could not be categorized by industrial sector because it concentrated on workers with back injuries and did not identify workplace sectors.

Populations

The populations studied included recreation workers; firefighters; coal miners; nurses; vegetable growers; carpenters; dairy farmers; general farmers; factory, hospital, field, beryllium, and construction workers; as well as workers who suffered back injuries. These studies covered populations of special interest to NIOSH, including adolescents in farming and Hispanic farm workers.

Health communication or social marketing

Seventeen studies claimed to have used HC principles to design the occupational safety intervention. Most studies were designed to either disseminate information or produce behavior change in selected target populations. Some articles assessed communication materials already distributed and several examined the impact of various message types on safety practices. All of these studies, including the two claiming to be SM interventions, met the criteria for being considered evidence-based health communication: They used scientific principles and communication strategies to improve worker health and safety.

SM was reported in two occupational health and safety interventions. Chapman and associates (2003) designed an intervention to increase the adoption by dairy farmers of bag silos, barn lights, and a calf feed mixing site. These practices had been shown to be safer and more profitable for dairy farms. The intervention focused on the use of the Diffusion of Innovations Theory (DIT) with the incorporation of SM. The authors stated that they used SM principles for

audience segmentation and several channels to relay the main messages and materials (print mass media, public events, University Extension, consultants, and other dairy farmers). The authors concentrated on DIT in other studies and may have been more comfortable with this theory for planning interventions than the SM planning model.

Although it is not possible to conclude from the article if more SM steps were conducted than described, there were several areas where use of SM would have been a benefit for this campaign. First, the investigators used data from previous studies completed in the 1990s as the basis for the intervention but did not conduct any formative research themselves with the target group. The perceptions, needs, and opinions of the target group could have changed over the years. Second, the authors did not assess present-day promotion strategies for high-lighting products. Third, the findings did not show a significant increase in the adoption of the safety practices (barn lights, silo bags, and calf feed mixing site) by farmers. These were not the outcomes the investigators had hoped to achieve. They did report after the intervention an increase in the awareness of farm managers regarding barn lights and calf feed mixing sites. The use of a more comprehensive SM approach may have significantly increased the outcome success.

The other project (Keller et al. 2005) also did not meet the social marketing criteria. Despite the use of formative research and a marketing firm to design their intervention, this project relied exclusively on communication materials to educate nurses about the prevention of exposure to hepatitis C.

The impact of this SM intervention was reduced by a number of factors. First, the information mailed out had no accompanying campaign through media or other means alerting nurses to the significance of the effort. Nurses simply received a mailed-out packet of information and a letter. Second, the authors did not segment the target audience and sent the materials to a general mix of nurses rather than to direct care nurses – the target group concerned with exposure to hepatitis C. Third, only one channel was used to reach nurses, and the limitations of this decision were pointed out by participants themselves. Fourth, the program did not consider product benefits, the price of behavior change, convenience of access, or promotion strategies. In other words, the marketing mix and standard promotion practices were never discussed in the paper, despite the fact that they are crucial for success. Fifth, it was disappointing that the social marketing firm did not have a more active role in this effort. The reason for this was not addressed in the article. Sixth, there were few behavior changes in the nurses. A targeted SM campaign could have significantly helped to increase

the safety behavior outcomes in nurses, resulting in better protection of these healthcare workers from exposure to hepatitis C.

Theoretical frameworks

Eighteen studies relied on a theoretical framework to guide initial planning efforts, and six relied on multiple theories to inform the intervention. The theories cited included: the Causal Model of Farm Safety Behavior, Communication Matrix Theory, Diffusion of Innovations Theory, Extended Parallel Process Model, Elaboration Likelihood Model, Narrative Theory, Pender Health Promotion Model, Persuasion Theory, Protective Motivation Theory, Social Cognitive Theory, Social or Observation Learning Theory, Theory of Planned Behavior, Theory of Reasoned Action, and the Transtheoretical Model of Change. The remaining project did not cite a theoretical basis but mentioned social marketing as a planning framework; however, as already noted, this project did not comply with established benchmarks for social marketing.

Evaluation design

Experimental study designs are considered the strongest evidence of intervention effectiveness. However, they are often difficult to use in occupational safety and health because of the inability to randomize workers into treatment and control groups. Not surprisingly, only seven studies selected for review in this article utilized a true experimental design; the remainder used less stringent designs, ranging from quasi-experimental to non-experimental but mostly the latter (Cook and Campbell 1979; Robson et al. 2001; Ruotsalainen et al. 2006; Shadish, Vook, and Campbell 2002).

These studies report numerous limitations in their evaluation designs, including: data collection procedures with only one pre- and post-data point and no other time series data, reliance on self-reported data, lack of a baseline measure, failure to assess sustained behavior change, low response rates, inability to conduct an experimental study, and bias introduced from other sources. All of these reduced the impact of the interventions included in this study.

Outcome (Did the interventions succeed?)

Despite a reliance on HC instead of SM principles, 13 of the studies attempted to change behavior instead of, or in addition to, knowledge. In 11 projects, the authors claim some degree of success, although this varies widely. Only a few studies utilized follow-up assessments further out from the intervention that might

indicate some sustainability of effects. Only four of the studies used any follow-up assessments via observation or a second data collection point after the intervention.

Impact of organizational decision-maker support on sustaining intervention outcome

SM and HC occupational safety and health intervention design must include both the worker and the organization decision makers. Workers can decide to make behavior changes in their work practices to protect themselves from injury, illness, or death. However, if the organizational decision makers do not support changes to increase safe working conditions and protective measures, behavior change outcomes will not be sustained. Companies often must actively supply and support the use of protective equipment and practices. This dual approach is imperative to achieve successful worker safety and health.

Of the studies included in this analysis, eleven involved workers and organization managers. In the Agriculture, Forestry and Fishing Sector four studies were aimed at farmers who potentially acted as both managers and workers on their own farms (Chapman et al. 2003, 2004; Marlenga, Pickett, and Berg 2002; Rodriguez et al. 1997). In the Construction Sector, workers and managers participated in the 2003 Inman and Blaciforti study, which was geared to increasing the use of protective eyewear. The Healthcare and Social Assistance Sector included two interventions that assessed organization decision makers. The Sinclair et al. study in 2002 concentrated on the adoption of safe needle-stick practices and policies by U.S. hospitals, and the Maxfield et al. study in 2000 assessed the adoption of practices by U.S. hospitals to protect healthcare workers from exposure to latex. In the Manufacturing Sector, the Lusk et al. 2003 intervention was conducted in an automotive factory, and the Tan-Wilhelm et al. 2000 intervention was carried out in a precision-machining plant. In both cases, workers were the concern but company managers supplied access. In the Services Sector, the Welbourne and Booth-Butterfield study in 2005 focused on fire chiefs, the managers, and organization decision makers for firefighter safety. The Buller et al. study in 2005 spotlighted recreational workers but also included input from recreational facility managers. The behavior change in these studies varied, and it is not possible to make a clear judgment as to the impact of decision-maker participation in these interventions because of the number of limiting factors affecting the different interventions. The remaining eight studies in the different sectors were geared to the use of graphics, message development, training, information materials, or workers only.

Discussion

“The gap between research and practice in many areas of health care and public health is large, well documented, and troubling . . .” (Glasgow and Emmons 2007, 414). To bridge this gap, NIOSH, like many federal agencies, has launched a systematic effort to translate its scientific findings into practical products, practices, and policies to protect American workers. As part of this r2p initiative, NIOSH is using HC and SM principles and techniques.

This review of the occupational safety intervention literature during the last 15 years identified 50 articles that self-reported the use of evidence-based HC or SM principles in designing and evaluating interventions to protect American workers. A careful review of 19 studies revealed that all projects met the criteria to be classified as evidence-based HC interventions, but none incorporated all the benchmarks established for social marketing interventions – *consumer orientation*; *audience segmentation*; reliance on an *integrated marketing mix*; and application of the *exchange and competition concepts* to achieve *behavioral goals* (National Social Marketing Center 2008).

Results of this study are consistent with findings from Railton Hill’s (2001, 41) review of the health promotion literature that found an overemphasis on the communications or promotional component of the marketing mix and clear absence of a true “overarching marketing plan.” These findings also reinforce Grier and Bryant’s (2005) observation that many public health professionals still mistakenly equate social marketing with social advertising.

Despite our failure to identify a single occupational safety program that met all the criteria to be considered an SM intervention, it is important to note that numerous occupational safety programs have reported the use of specific marketing principles in developing their program strategies or materials. For example, the use of formative research to understand consumer perceptions of an occupational problem or safety practice and materials pretesting have become relatively widespread (May et al. 2006; Murray-Johnson et al. 2004; Parrott et al. 1996, 1998; Patel et al. 2001; Salazar, Keifer, and Estrada 2005; Sorensen et al. 2006, 2008). The data from these formative studies will have a significant impact on the development and outcomes of SM interventions that are implemented.

It also is important to note that this study only examined projects conducted in the United States. In 1981, Canada created a Social Marketing Health Directorate to deal with health promotion issues. WorkSafe BC (the Canadian Workers Compensation Board) has funded social marketing research in the field of occupational safety and health. In 2005, it funded the *Using Social Marketing to*

Increase Occupational Health and Safety study (Anne M. Lavack, University of Regina) and *A Review of Social Marketing Campaigns in Occupational Injury, Disease or Disability Prevention* (Cameron A. Mustard, Institute for Work & Health, Toronto, Ontario). In 2006, *The Alberta Back Pain Initiative Study: Evaluation of a Population Based Social Marketing Intervention for the Prevention of Disability Associated with Back Pain*, (Douglas Gross, University of Alberta) and *Population-based Survey of Beliefs about Neck and Upper Extremity Injuries: Prelude to Social Marketing Campaigns Designed to Reduce Disability* Robert Ferrari (University of Alberta) studies were funded by WorkSafe BC. The creation of the National Social Marketing Centre by the British government has escalated the use of SM throughout the United Kingdom. A number of public health campaigns are underway. Many other countries are also utilizing SM to improve public health.

Limitations of the Study

An extensive search for occupational communication safety and health studies was conducted for this article; however, some papers may have been unintentionally missed. Papers appeared in a variety of media, including peer-reviewed journals, conference proceedings, theses and dissertations, and reports. The latter two were difficult to search because they were not indexed in bibliographic databases. Conference proceedings often included abstracts which were not developed for papers in the literature.

Conclusion

Evidence-based health communication principles and practices have gained popularity as a planning framework for occupational safety and health programs in the United States, especially those funded or developed by NIOSH. Although social marketing's potential to guide the translation of research findings into practice has been recognized (Formoso, Marata, and Magrini 2007; Maibach, Van Duyn, and Bloodgood 2006), its realization in the field of occupational safety and health has been woefully lacking. Barriers to more widespread application of this powerful planning framework include overemphasis of promotional or communication activities and subsequent failure to develop a comprehensive intervention that integrates the full marketing mix and lack of personnel trained in social marketing principles and practices (Grier and Bryant 2005).

To address these shortcomings, NIOSH has begun training project officers and senior staff how to apply the marketing mindset to optimize social marketing's impact (Grier and Bryant 2005). NIOSH officials are also encouraging occupational safety and health researchers to incorporate marketing principles

into r2p activities from the very inception of their research through dissemination to American businesses and other partners and stakeholders. While these training activities and commitment to “design for translation” have yet to come to full fruition, the benefits of applying marketing techniques are evident in the programs featured in this special issue of the *Social Marketing Quarterly*.

About the Authors

Virginia H. Sublet, Ph.D., is a senior health scientist, Office of Health Communication and Global Collaborations, Office of the Director, National Institute for Occupational Safety and Health (NIOSH). For the last three years Dr. Sublet has worked through her research and responsibilities to increase the use of social marketing at NIOSH.

Max R. Lum, Ed.D., is associate director, Office of Health Communication and Global Collaborations, Office of the Director, National Institute for Occupational Safety and Health (NIOSH), Washington, DC. Dr. Lum is a well-known expert in the area of health communication and an advocate of social marketing. He has supported the training of several staff in the area of social marketing.

References

- ANDREASEN, A. 1995. *Marketing social change: Changing behavior to promote health, social development, and the environment*. San Francisco: Jossey-Bass.
- BAL, M. 1997. *Narratology: Introduction to the theory of narrative*. 2nd ed. Toronto: University of Toronto Press.
- BANDURA, A. 1977. *Social learning theory*. New York: General Learning Press.
- BANDURA, A. 1986. *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice Hall.
- BANDURA, A. (Ed.). 1995. *Self-efficacy in changing societies*. New York: Cambridge University Press.
- BOOTH-BUTTERFIELD, S., J. WELBOURNE, C. WILLIAMS, and V. LEWIS. 2007. Formative field experiments of a NIOSH Alert to reduce the risks to firefighters from structural collapse: Applying the cascade framework. *Health Communication* 22(1): 79–88.
- BULLER, D., P. ANDERSON, B. WALKOSZ, M. SCOTT, G. CUTTER, M. DIGNAN, E. ZARLENGO, J. VOEKS, and A. GIESE. 2005. Randomized trial testing a worksite sun protection program in an outdoor recreation industry. *Health Education and Behavior* 32(4): 514–35.
- CHAPMAN, L., A. NEWENHOUSE, R. MEYER, A. TAVIRA, B. KARSH, J. EHLERS, and T. PALERMO. 2004. Evaluation of an intervention to reduce musculoskeletal hazards among fresh market vegetable growers. *Applied Ergonomics* 35: 57–66.

- CHAPMAN, L. J., A. D. TAVEIRA, K. G. JOSEFSSON, and D. HARD.** 2003. Evaluation of an occupational injury intervention among Wisconsin dairy farmers. *Journal of Agricultural Safety and Health* 9(3): 197–209.
- COOK, T. D., and D. T. CAMPBELL.** 1979. *Quasi-experimentation: Design and analysis for field settings*. Chicago: Rand McNally.
- ELKIND, P. D., K. PITTS, and S. L. YBARRA.** 2002. Theater as a mechanism for increasing farm health and safety knowledge. *American Journal of Industrial Medicine* 2(Supplement): 28–35.
- FISHBEIN, M. and J. AJZEN.** 1975. *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- FORMOSO, G., A. M. MARATA, and N. MAGRINI.** 2007. Social marketing: Should it be used to promote evidence-based health information? *Social Science and Medicine* 64: 949–53.
- GLASCOW, R. E., and K. M. EMMONS.** 2007. How can we increase translation of research into practice? Types of evidence needed. *Annual Reviews of Public Health* 28: 413–33.
- HAZARD, R. G., S. REID, L. D. HAUGH, and G. MCFARLANE.** 2000. A controlled trial of an educational pamphlet to prevent disability after occupational low back injury. *Spine* 125(11): 1419–23.
- HILL, R.** 2001. The marketing concept and health promotion: A survey and analysis of recent “health promotion” literature. *Social Marketing Quarterly* 7(1): 29–53.
- INMAN, D., and L. BLACIFORTI.** 2003. Observed versus reported behaviors and a theoretically-based eye injury intervention for carpenters. *Injury Insights*: 1–2, 7.
- KELLER, S., K. DAILEY, J. HYDE, and R. D. CHURCH.** 2005. Hepatitis C prevention with nurses. *Nursing and Health Sciences* 7: 99–106.
- KIDD, P., D. REED, L. WEAVER, S. WESTNEAT, and M. K. RAYENS.** 2003. The trans-theoretical model of change in adolescents: Implications for injury prevention. *Journal of Safety Research* 34: 281–88.
- KREPS, G.,** 2002. The evolution and advancement of health communication inquiry. In *Communication yearbook 24*, ed. W. Gudykunst, 231–44. Three Oaks, CA: Sage.
- LINDSAY, G., and E. ARONSON.** (eds.) 1985. *The handbook of social psychology*, Vol 1, 3rd ed., 233–346, New York: Newberry Award Records, Inc.
- LUSK, S. L., D. L. RONIS, A. S. KAZANIS, B. L. EAKIN, O. HONG, and D. M. RAYMOND.** 2003. Effectiveness of a tailored intervention to increase factory workers’ use of hearing protection. *Nursing Research* 52(5): 289–95.
- LUSK, S., O. HONG, D. RONIS, B. EAKIN, and M. KERR.** 1999. Effectiveness of an intervention to increase construction workers’ use of hearing protection. *Human Factors* 41(3): 487–94.
- MAIBACH, E., M. A. VAN DUYN, and B. BLOODGOOD.** 2006. A marketing perspective on disseminating evidence-based approaches to disease prevention and health promotion. *Preventing Chronic Disease* 3(3).

- MARLENGA, B., W. PICKETT, and R. L. BERG. 2002. Evaluation of an enhanced approach to the dissemination of the North American Guidelines for Children's Agricultural Tasks: A randomized controlled trial. *Preventive Medicine* 35: 150–59.
- MAXFIELD, A., J. LEWIS, S. LACHENMAYR, J. TISDALE, and M. A. LUM. 2000. A National Institute for Occupational Safety and Health *Alert* sent to hospitals and the intentions of hospital decision makers to advocate for latex allergy control measures. *Health Education Research* 4(15): 463–67.
- MAY, J. J., J. SORENSEN, P. BURDICK, G. EARLE-RICHARDSON, and P. JENKINS. 2006. Rollover protection on New York tractors and farmers' readiness for change. *Journal of Agricultural Safety and Health* 12(3): 199–213.
- McGUIRE, W. J. 1984. Public communication as a strategy for inducing health-promoting behavioral change. *Preventive Medicine* 13(3): 299–313.
- MORGAN, S. E., H. P. COLE, T. STRUTTMANN, and L. PERCY. 2002. Stories or Statistics? Farmers Attitudes toward Message in an Agricultural Safety Campaign. *Journal of Agricultural Safety and Health* 8(2): 225–39.
- MURRAY-JOHNSON, L., K. WITTE, D. PATEL, V. OREEGO, C. ZUCKERMAN, A. MAXFIELD, and E. THIMONS. 2004. Using the extended parallel process model to prevent noise-induced hearing loss among coal miners in appalachia. *Health Education and Behavior* 13(6): 741–55.
- NATIONAL CANCER INSTITUTE. 2002. *Making health communication programs work*, (NIH Publication No. 02-5145). Rockville, MD: U.S. Department of Health and Human Services.
- NATIONAL CANCER INSTITUTE. 2005. *Theory at a glance, a guide for health promotion practice* (NIH Publication No. 05-3896). Rockville, MA: U.S. Department of Health and Human Services.
- NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH. 2008. Burden of injury, illness, and death. About the National Institute for Occupational Safety and Health (NIOSH). <http://www.cdc.gov/NIOSH/>(accessed June 23, 2008).
- NATIONAL SOCIAL MARKETING CENTRE. 2008. *What is Social Marketing?* London, United Kingdom. <http://www.nsms.org.uk/public/default.aspx?PageID=10>(accessed June 23, 2008).
- PARROTT, R., D. LEWIS, K. JONES, C. STEINER, and L. GOLDENHAR. 1998. Identifying feed and seed stores as a site to promote skin cancer control: A social marketing approach to agricultural health communication. *Journal of Agricultural Safety and Health* 4(5) Special Issue 1: 149–58.
- PARROTT, R., C. STEINER, and L. GOLDENHAR. 1996. Georgia's harvesting health habits: A formative evaluation. *The Journal of Rural Health* 12(4): 291–300.
- PARROTT, R., K. WILSON, C. BUTTRAM, K. JONES, and C. STEINER. 1999. Migrant farm workers' access to pesticide protection and information Cultivando Buenos Habitos campaign development. *Journal of Health Communication* 4: 49–64.

- PATEL D. S., K. WITTE, C. ZUCKERMAN, L. MURRAY-JOHNSON, V. ORREFFP, A. MAXFIELD, S. MEADOWS-HOGAN, and J. TISDALE.** 2001. Understanding barriers to preventive health actions for occupational noise-induced hearing loss. *Journal of Health Communication* 6: 155–68.
- PENDER, N.** 1996. *Health promotion in nursing practice*. 3rd ed. Stanford, CT: Appleton and Lange.
- PETTY, R. and J. CACIOPPO.** 1986. Elaboration likelihood model of persuasion. *Advances in Experimental Social Psychology* 19: 123–205.
- PROCHASKA, J. O., C. C. DiCLEMENT, and C. NORCROSS.** 1992. In search of how people change. *American Psychologist* 47: 1102–14.
- ROBSON, L., H. SHANNON, L. GOLDENHAR, and A. HALE.** 2001. *Resource: Guide to Evaluating the Effectiveness of Strategies for Preventing Work Injuries* (Publication No. 2061-119). Cincinnati, OH: Institute for Work and Health.
- RODRIGUEZ, L., C. SCHWAB, J. PETERSON, and L. MILLER.** 1997. The impact of an Iowa public information campaign. *Journal of Agricultural Safety and Health* 3(2): 109–23.
- ROGERS, E.** 1994. The field of health communication today. *American Behavioral Scientist* 38: 208–14.
- ROGERS, E. M.** 2003. *Diffusion of Innovations*. 5th ed. New York: Free Press.
- ROGERS, R. W.** 1975. A protection motivation theory of fear appeals and attitude change. *Journal of Psychology* 91: 93–114.
- RUOTSALAINEN, J., J. VERBEEK, J. SALMI, M. JAUHAINEN, I. LAAMANEN, I. PASTERNAK, and K. HUSMAN.** 2006. Evidence on the effectiveness of occupational health interventions. *American Journal of Industrial Medicine* 49: 865–72.
- SALAZAR, M., M. KEIFER, and F. ESTRAADA.** 2005. Occupational risk among orchard workers. *Family Community Health* 285: 239–55.
- SHADISH, W. R., T. D. VOOK, and D. T. CAMPBELL.** 2002. *Experimental and quasi-experimental designs for generalized causal inference*. Boston: Houghton-Mifflin.
- SHARF, B.** 1999. The present and future of health communication scholarship: Overlooked opportunities. *Health Communication* 11: 195–99.
- SINCLAIR, R. C., A. MAXFIELD, E. L. MARKS, D. R. THOMPSON, and R. M. Gershone.** 2002. Prevalence of safer needle devices and factors associated with their adoption: Results of a national hospital survey. *Public Health Reports* 117: 340–49.
- SORENSEN, J., J. MAY, P. JENKINS, A. JONES, and G. EARLE-RICHARDSON.** 2006. Risk perceptions, barriers and motivators to tractor ROPS retrofitting in the New York State farm community. *Journal of Agricultural Safety and Health* 12(3): 215–26.
- SORENSEN, J., J. MAY, K. PAAP, M. PURSCHWITZ, and M. EMMELIN.** 2008. Encouraging farmers to retrofit tractors: A qualitative analysis of risk perceptions among a group of high-risk farmers in New York. *Journal of Agricultural Safety and Health* 14(1): 105–17.

STANBURY, M., G. SOLICE-SAMPLE, and J. PESCATORE. 1993. Asbestos disease risk communication conducted by the New Jersey Department of Health. *American Journal of Industrial Medicine* 23: 97–104.

STEPHENSON, M. T., K. WITTE, C. VAUGHT, B. I. QUICK, S. BOOTH-BUTTERFIELD, D. PATEL, and C. ZUCKERMAN. 2005. Using persuasive messages to encourage voluntary hearing protection among coal miners. *Journal of Safety Research* 36: 9–17.

TAN-WILHELM, D., K. WITTE, W. LIU, L. S. NEWMAN, A. JANSSEN, C. ELLISON, A. YANCEY, W. SANDERSON, and P. HENNEBERGER. 2000. Impact of a worker notification program: Assessment of attitudinal and behavioral outcomes. *American Journal of Industrial Medicine* 37: 205–13.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES. 2000. *Healthy people 2010*, Volume 1, Area 11. Washington, DC: U.S. Government Printing Office.

WELBOURNE, J., and S. BOOTH-BUTTERFIELD. 2005. Using the theory of planned behavior and a stage model of persuasion to evaluate a safety message. *Health Communication* 18(2): 141–54.

WITTE, K., G. MEYER, and D. MARTELL. 2001. *Effective health risk messages*. Thousand Oaks, CA: Sage.