

Understanding Risk Perception Theories, tools and measurement



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Perceiving Health Hazards

- Please write down which of the following risks you think are the most risky to the health of Canadians, in order of greatest to least risk

- Stress
- Physical Inactivity
- Pesticides
- Fast Food
- Cigarette Smoking
- Obesity
- Poverty
- Air Pollution
- Unprotected sex
- Wait Lists for Health Care

Canadian's perceptions

Top risks ranked as "high health hazards" in 2004

- 1) Cigarette Smoking
- 2) Obesity
- 3) Unprotected sex
- 4) Stress
- 5) Physical Inactivity
- 6) Wait Lists for Health Care
- 7) Fast Food
- 8) Poverty
- 9) Air Pollution
- 10) Pesticides

Leading Causes of Death, Canada 1997 (Statistics Canada)

Causes	# Deaths (%)
Cancer (all kinds)	58,703 (27.2%)
Heart Diseases	57,417 (26.6%)
Cerebrovascular	16,051 (7.4%)
COPD	9,618 (4.5%)
Unintentional Injuries	8,626 (4.0%)
Pneumonia and influenza	8032 (3.7%)
Diabetes	5,699 (2.6%)
Hereditary and degenerative diseases of the CNS	5,049 (2.3%)
Diseases of the arteries	4,767 (2.2%)
Psychoses	4,645 (2.2%)

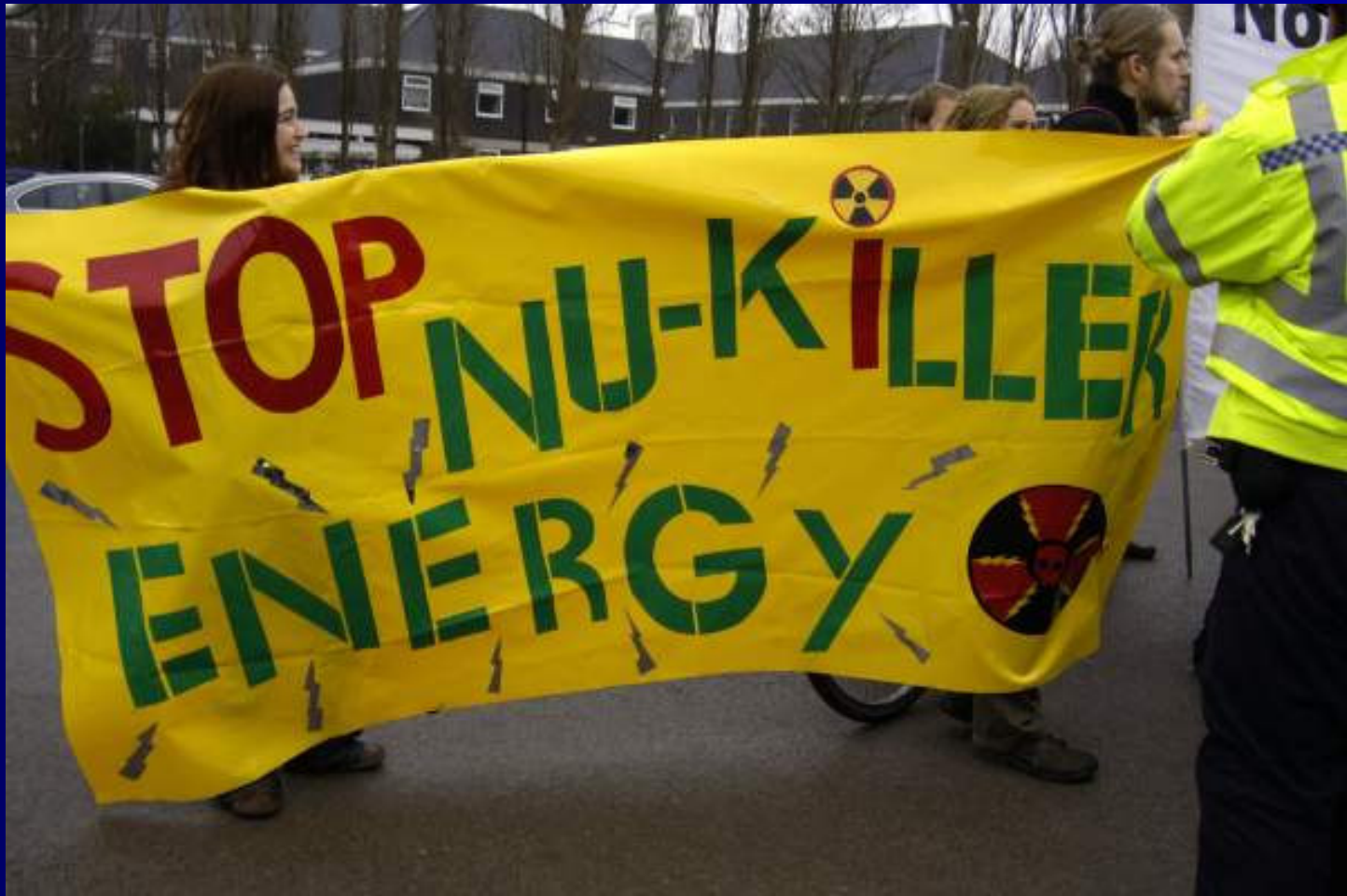
Outline of Presentation

- Introduction
- Why Risk Perception is important
- What influences Risk Perception
- Examples of ways to measure risk perception

Introducing risk perception

- Risk is both a technical and non-technical term
 - Peter Sandman: Risk = Hazard + Outrage
 - Hazard is the quantitative aspect
Estimates, probabilities, etc.
 - Outrage in the qualitative aspect
Emotive, psychological
- Evolution of scientists' approach
 - From "getting the numbers right" (1970s) to an interactive approach that accepts the public as a partner rather than simply an audience

Outrage?



Why is Risk Perception important?

- How people perceive risks can impact risk management
 - High levels of public concern (outrage) can result in more danger than that posed by the risk itself
 - When outraged, people stop listening
 - Low levels of public concern can result in health risks
- Numbers or statistics are often the least important factor in determining how risk situations play out

What influences risk perception?

- Many theoretical perspectives
 - Individual
 - Socio-demographic characteristics
 - Affect Heuristic (Finucane, Slovic et al)
 - Optimistic Bias (Weinstein)
 - Cultural Theory (Wildavsky et al.)
 - Psychometric parameters (Slovic, Fischhoff et al.)
 - Trust (Slovic, Fischhoff et al.)
 - Societal
 - SARF (Kasperson, Pidegoen et al.)
 - Risk Society (Beck et al.)

Socio-demographic Characteristics

- Gender
 - Women tend to be more risk adverse than men-
various theories as to why this is
- Ethnicity
 - Perceptions of risk vary by ethnicity and culture
 - Finucane, Slovic et al. "White Male Effect"
 - Historical patterns of privilege and power may
increase perceptions of control over risks
- Education
 - Those with higher education tend to be more
tolerant of risks

Optimistic Bias

- The tendency for people to view themselves and invulnerable
 - “Rose-colored glasses” effect
- Causes not yet clear
- Important to consider that people don't always see themselves as the “target population”
 - May be less inclined to pay attention to risk messages

Psychometric Parameters

Better	Worse
Voluntary	Involuntary
Controllable	Uncontrollable
Familiar	Exotic
Statistical	Catastrophic
To Adults	To Children
Natural hazard	Human made hazard
Not dreaded	Dreaded
Distributed fairly	Not distributed fairly

Example: perception vs. impact

Medications	Nuclear Power
Somewhat voluntary	Uncontrollable
Controllable	Exotic
Familiar	Potentially Catastrophic
Not dreaded	Human made hazard
Distributed fairly	Dreaded

Impact

- Adverse Drug Reaction mortality in the US: Between 76,000 and 106,000 deaths/year. Canada estimated to have ~ 1/10 of these
- Mortality and morbidity associated with Nuclear power plants significantly lower

Cultural Theory: “types” of people react differently to risk

Individualist	<ul style="list-style-type: none">- Value individual initiative in the marketplace- Fear threats that hamper free exchange
Egalitarian	<ul style="list-style-type: none">- Believe the good of the group comes before the good of any individual- Advocate the precautionary principle
Hierarchist	<ul style="list-style-type: none">- Believe in the need for system of rules, and fear risks that disrupt those rules- Rely on experts who can identify limits and establish bounds
Fatalist	<ul style="list-style-type: none">- Feel they have little control over events- Resign themselves to fate
Autonomous	<ul style="list-style-type: none">- The hermit. Because so few people fit this description, and it is by definition not a viable basis for a society, it is often ignored

Trust

- Clear and robust relationship between risk perception and trust
 - Being open and transparent increases perception of trust
- The more trust-worthy a source, the greater the acceptance of:
 - Risk information or messages
 - Risk policies and management options
- Hard to earn, very easy to lose

Major Canadian sources of information versus most trusted sources

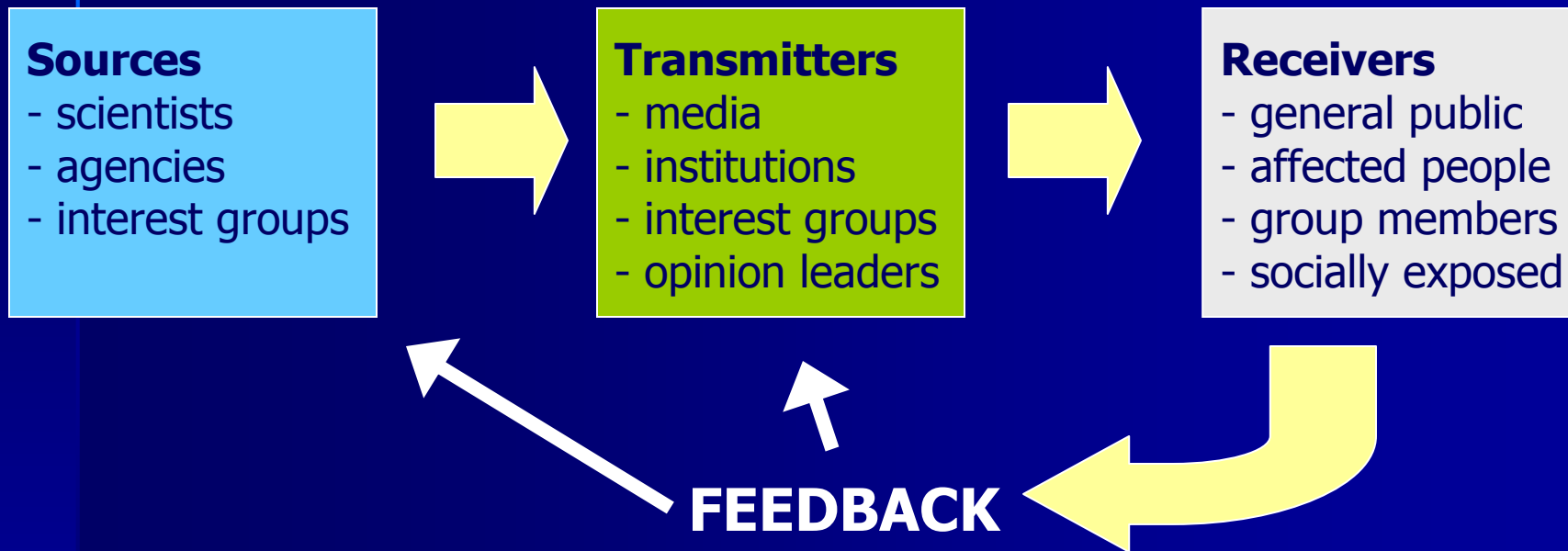
Sources	Most used	Most trusted
News Media	1	5
Medical Doctors	2	1
Internet	3	6
Health Brochures	4	3
Friends and Relatives	5	4
Univ. Scientists/Science Journalists	6	2
Public Interest or Environmental Groups	7	7
Government	8	6
Industry	9	9

Social amplification of risk (SARF)

Pidgeon, Kasperson, & Slovic 1992

- That physical events are observed and interpreted by groups and individuals, amplified by individual and social processes, and then expressed in terms of social consequences (Renn et al. 1992)
- Key variables
 - Self interest, moral outrage, fear and the media
- Issues can be either amplified or attenuated by these processes

SARF, con't: Risk events and their characteristics



Secondary (ripple) effects can be as important as immediate impacts

SARF example: BSE

- Transmitters (esp. media) help to select the “hazard template” through which the risk is understood
 - previous listeria and salmonella scares affected perception of BSE risk in UK
 - BSE incident went on to influence how GM food issue was framed in the media and public discourse
- Hazard templates can change due to “critical points” when image of risk changes
 - 1996 announcement of possible link between BSE and Creutzfeldt-Jakob Disease

Measuring Risk Perception

- Emerging area
- Range of approaches
 - Qualitative
 - Quantitative
- Roots in psychology

Quantitative methods

- Generally cross sectional
 - Some repeated measures studies
 - Often evolve from qualitative work
- Measurement tools include
 - Likert scales
 - Estimates of statistical probabilities
 - Elicited preferences/risk comparisons
 - Risk Ranking exercises

Likert Scales

- On a scale of 1-5,
 - extremely large risk (5).....no risk (1)
- Example: "I believe the blood supply in Canada is safe ."
 - strongly disagree, disagree, agree, or strongly agree
- Critiques:
 - challenging to respondents
 - Problems of unequal intervals

Estimates of Statistical probabilities

- Quantitative estimate of risk
 - How likely it is that global warming will affect your health in the next 5 years?
 - 1 in a million, 1 in a thousand etc.
 - Open ended
- Critique
 - Issues of numeracy, not comfortable with numbers, may impede understanding of risks
 - More difficult to estimate absolute risk than comparative risk

Risk Estimate Guide

CHANCE	PROBABILITY
Definitely will happen	100% probability
Better than a 50% chance	~ 75% probability
50 / 50 chance	50% probability
1 in 3 chance	33% probability
1 in 5 chance	20% probability
1 in 10 chance	10% probability
1 in 100 chance	1% probability

Etc, scale goes to 1 in a million

Risk questions

- Okay, now thinking about yourself and your current job: what do you think the percent chance or the probability is, using this scale, that you will:

	Subject rating
Be involved in a work place related accident over the next year that will require some simple first aid treatment?	[<u> </u> <u> </u> <u> </u>] 27 Š 29
Become seriously injured or disabled (i.e. requiring hospitalization or extended leave of more than 3 months time off) as a result of your job?	[<u> </u> <u> </u> <u> </u>] 30 Š 32
Develop a chronic disease or illness as a result of exposures or hazards in the workplace	[<u> </u> <u> </u> <u> </u>] 33 Š 35
Be fatally injured or killed on the job	[<u> </u> <u> </u> <u> </u>] 36 Š 38

Elicited preferences/Risk comparisons

Compare one risk to another

e.g. Compared to offshore oil drilling, do you think that farming, as an occupation, is more, the same or less risky?

Determine acceptable levels of risk

e.g. Technology A, which will be used to cure a certain type of cancer, will cause deaths in 10% of cancer patients

- a. Could be riskier; it would be acceptable if it were ___ times riskier
- b. It is presently acceptable
- c. Too risky; to be acceptable, it would have to be ___ times less risky

Qualitative methods

- Interviews
 - e.g. psychodynamic semi structured interviews
- Focus groups
 - With patients, community members, policy makers, etc.
- Mental Models
 - In-depth interviews with experts and laypeople

In-depth interviews and focus groups

- Very good starting point
 - Provide information on how a target population expresses concepts about risks, values, etc.
 - Very helpful for cross cultural issues
- Example:
 - How worried are you about the risks of driving while using a cell phone?
 - Please tell me what you think are the risks you face from climate change?
- Critiques: generalizability, bias, privacy during focus groups etc.

Mental Models

- 2 step process (Morgan, Fischhoff et al.)
- Based in visualization
- Step 1: Formal analysis of information from topic experts
 - Integrated assessment of the science
 - “expert model”
- Interviews/surveys of target audience
 - Conceptualizations of risks and benefits
 - “lay model”
- Compare and contrast models to
 - Identify gaps, misconceptions
 - Determine decision-making needs

Mental Models example

- Climate change (Bostrom et al, 1994)
- Laypeople/expert model comparison results
 - Serious misinformation problems
 - Ozone depletion confusion
 - Greenhouse interpreted as the world becoming overall a more hot and steamy place
 - Few people understood the links to CO₂ and energy use
 - Recommended pollution control as main policy thrust
- Results used to develop programs aimed at communicating about climate change

Conclusion

- Risk perception can play a significant role in the adoption of new behaviors, policies, etc.
 - Knowledge and behavior are not necessarily directly linked
- Risk perception is a key factor for
 - Risk management
 - Communicating controversial or uncertain science

Conclusion, con't

- Need to understand risk perception
 - Not just one simple perception
 - Myriad of influential factors
- Risk perception research can
 - Help improve risk communication
 - Mediate outrage
 - Improve credibility
 - Improve media relations
 - Provide a more thorough understanding of a target audience
 - Facilitate KT of policy and practices