Leeds University Business School

UNIVERSITY OF LEEDS

Online Examination Coversheet

Student ID Number:	2	0	1	8	0	0	7	5	5
Module Code:	LUBS5202M								
Module Title:	Risk Perception and Communication								
Module Leader:	Joshua Weller								
Declared Word Count:	2914								

Please Note:

Your declared word count must be accurate, and should not mislead. Making a fraudulent statement concerning the work submitted for assessment could be considered academic malpractice and investigated as such. If the amount of work submitted is higher than that specified by the word limit or that declared on your word count, this may be reflected in the mark awarded and noted through individual feedback given to you.

It is not acceptable to present matters of substance, which should be included in the main body of the text, in the appendices ("appendix abuse"). It is not acceptable to attempt to hide words in graphs and diagrams; only text which is strictly necessary should be included in graphs and diagrams.

By submitting an assignment you confirm you have read and understood the University of Leeds **Declaration of Academic Integrity** (http://www.leeds.ac.uk/secretariat/documents/academic_integrity.pdf).

A1.

Introduction

A mental model is an internal framework that people use to understand and interact with their surroundings. It includes beliefs, assumptions, knowledge, and thought processes that help people understand a specific topic. They play an important role in many areas, such as education (they affect how well students grasp and remember new ideas) and business (they help with strategic thinking and decision-making) (Gentner et al., 1983). Effective risk communication requires understanding the audience's mental models because they influence how a person perceives, interprets and responds to risk. This allows the communicators to formulate messages which address the communication gap and align with the audience's existing knowledge, leading to better decision-making and effective risk management (Morgan et al., 2002). This is also known as a mental model approach. Employees working night shifts often struggle with fatigue due to multiple reasons. Therefore, it is important to address and come up with techniques to mitigate fatigue because it can significantly weaken cognitive function, attention and decision-making abilities increasing the chances of accidents and errors, particularly in sectors like healthcare, transportation and manufacturing (Folkard et al., 2003). The First 3 steps of the mental model approach will be utilised for risk communication in context of reducing fatigue in night shift employees.

Step 1: Creation of Normative or Expert model

This model provides instructions and information on the best strategies for employees to reduce night shift fatigue. First, a thorough analysis is conducted to assess the nature and severity of dangers from fatigue during night shifts. This is achieved in two steps:

- Conduct a thorough analysis of the existing literature on risk from fatigue among night shift employees belonging to various fields such as healthcare, IT, transportation etc. Summarise the key points and identify relevant themes and research gaps.
- Gather a diverse group of experts from relevant domains and facilitate group discussions or personal meetings. This will encourage them to share their experiences and insights and refine the collected information.

Next, an influence diagram is used to formally represent the interpretation of knowledge from the expert panel. An influence diagram is a directed graph from the decision theory domain which contains nodes connected through arrows or "influences". In our case, each node represents a factor leading to fatigue. The expert model once created, is then validated by technical experts from different backgrounds to enhance accuracy.

<u>Expected Outcomes:</u>

- A complete list of possible factors that cause exhaustion in night shift employees such as mood, sleep deprivation, sleep cycle disruption, overtime etc.
- Identification of practical techniques that can be implemented in the workplace like light-based intervention (Olson et al.,2020) and strategic power naps.

<u>Insights for Communication Design:</u>

The expert model will act as the gold standard with which the descriptive model can be compared. It will provide a robust framework for tailored communication messages, structured policy development and custom training programs.

Step 2: Creation of Descriptive or Lay Model

This model will contain information about what the night shift employees already know about fatigue and how are they handling it. First, the primary factors causing fatigue are identified by conducting open-ended interviews (taking responses expressed in their own terms). The interview protocol is based on an influence diagram so that important topics are covered. It allows for the employees' positive and negative beliefs to be expressed clearly to the interviewer. Then a confirmatory questionnaire can be constructed to capture the beliefs captured in open-ended interviews and expert model. This can be then distributed to a larger group of night shift employees to estimate the prevalence of these beliefs within the population.

Expected Outcomes:

This model will reveal employees' current perceptions and understanding of fatigue, as well as the effects it has on their physical and mental health. It will also help in identifying their misconceptions and knowledge gaps. Moreover, it will provide information on existing behaviours and strategies that employees use to handle fatigue.

Insights for Communication Design:

The lay model will identify areas where employees' understanding matches or differs from the expert model. This information will help in developing customised messages that resonate with employees' experiences, address their individual needs and meet their demands.

Step 3: Creation of communication message

The objective of this step is to develop effective communication materials that bridge the knowledge gaps and correct misconceptions identified in the lay model. First, discrepancies are identified between employees' perceptions and expert knowledge by analysing how well the mental models correspond to expert models. Those areas are determined which have significant gaps in terms of the knowledge gap and incorrect beliefs. Formulate clear, relatable, and actionable messages that address these gaps and ensure messages are conveyed in a way that is familiar to the employees. These will include practical tips and strategies for managing fatigue based on expert recommendations. Finally, to evaluate the accuracy of the message, the communication material can be distributed to a small group of night-shift employees and feedback can be gathered concerning clarity, relevance, and effectiveness. Based on these suggestions, the messages and delivery methods can be updated to better resonate with the night-shift employees.

Expected Outcomes:

Identification of specific knowledge gaps e.g. misunderstanding the impact of caffeine timing, underestimating the benefits of short naps. Recognition of effective communication channels and formats for this audience.

Proposed communication design:

- Develop posters and digital messages that explain the science behind the harmful effects of fatigue on health and performance.

- Provide specific advice on consumption of items such as caffeine, nicotine etc.
- Highlight the benefits of short naps and suggest optimal times and durations for taking them.
- Use relatable stories and testimonials to spread success stories of fellow employees who have implemented these strategies and got the results.

By following these steps, the communication strategy will effectively address the root causes of fatigue in night-shift employees and promote behaviours that reduce errors during night shifts thereby enhancing productivity, and alertness. It could also be utilised for the development of customised training programs.

A2.

Introduction

Risk perception is an important component of effective risk communication because it determines how people interpret, understand, and respond to potential threats (Slovic, 1987). By understanding how people perceive risks, communicators can create customised messages to address their concerns and priorities, increasing the effectiveness of the communication (Kasperson et al., 1988). Furthermore, bridging the gap between the audience's perception and the objective evaluation of risk can help build trust and credibility, increasing the chances that the audience will adopt the recommendations provided (Fischhoff et al., 1981). Understanding the audience's risk perception while developing risk communication strategies enables individuals to make informed decisions and take proactive steps to protect themselves and others from potential harm (Renn et al., 1991).

Factors affecting Risk perception

Paul Slovic is a famous American psychologist who has researched how people think about risk and how they communicate with each other. His contribution has helped us understand how people think about and react to risks, in the context of decision-making and public policy. Slovic's research has shown that how people feel, what they think, and their social connections can all affect how they see danger. It also shows that people often make decisions without thinking them through carefully. He also investigated the "psychometric paradigm," which measures how people think about the risks of different technologies, hobbies, or dangers. Slovic has identified two major factors that significantly affect risk perception:

1. **Dread**

   It refers to the emotional intensity and perceived severity of the consequences of taking a risk. It is not just the possibility of a negative result, but also the emotional response people expect if it occurs. Risks with potentially disastrous or irreversible outcomes invoke greater dread. The possibility of severe allergic reactions from consuming gene-edited food may be seen as a high-dread risk, even if the actual probability of it happening is low. The more clearly and easily people can imagine the negative outcomes of risk, the higher the dread it invokes. Hearing stories about people getting sick from unknown food sources may increase people's fear of gene-edited food. Risks where people feel they have little control over the outcome are

often viewed as more dreadful. If people feel they can't make informed decisions about consuming gene-edited foods, their fear of the technology may increase.

2. **Uncertainty**
   It refers to the level of unknown information about a risk. When people lack complete knowledge about the possible consequences of a risk, it can lead to a sense of nervousness and a perception of higher risk. People might perceive gene-editing technology as a high risk because of its fresh concept and so the long-term effects might not be fully understood. A complex scientific technique like gene editing can be perceived as uncertain by the public due to its unfamiliar nature. Technical language and unclear communication from the experts may further add to the uncertainty. Moreover, contradictory information from different media sources, industry professionals, influencers etc can create chaos and increase this uncertainty leaving people unsure about who to trust regarding the credibility and safety of gene-edited fruits and vegetables.

The Dynamic Relationship of Dread and Uncertainty

Dread and uncertainty frequently work together to shape how risks are perceived. High-dread consequences combined with high uncertainty can lead to a strong negative perception of a risk, even if the actual probability of harm is low.
For example, the public might be more accepting of the (relatively low probability) risk of a minor allergic reaction from gene-edited peanuts (lower dread) if there was more scientific agreement and clear communication about the safety measures taken (lower uncertainty).

Experts' vs Non-Experts' Risk Assessment

There is a significant gap between how the experts and non-experts perceive risks. Experts establish their assessment based on actual probability and consequences of risk calculated through numerical data (Kuberger et al., 2007), while the public assessment is more on the subjective side and is heavily dependent on the dread evoked and their familiarity with the risk (Slovic, 1987). It may also be due to differences in knowledge. This may result in a perception of higher risk than experts might assess and vice versa.

Relationship Between Perceived Risk and Benefits

Perceived gains refer to the positive outcome associated with a choice and perceived risks refer to the negative consequences. People may be more willing to accept a risk and ignore the outcome if the perceived gains outweigh the perceived risks. If the nutritional content of genetically modified foods is clearly communicated, public acceptance might increase even if these foods have negative environmental implications such as high fertiliser usage.
Affect or emotional responses such as fear, enthusiasm etc significantly affect these judgments. If an activity evokes feelings of fear or dread, then the individual may perceive high risk and low benefits, while if the same activity generates positive emotions in another individual, then he may perceive low risk and high benefits. Affect can also interact with cognitive functions such as information processing due to which people may overweigh certain aspects of a choice and ignore important information which may lead to an unoptimised decision-making process. People may initially resist the adoption of GE food due to the uncertainty surrounding the technology and the potential dread associated with it due to less knowledge, but perceived risks can be reduced if the gene-edited food brochure keeps public perception in mind by addressing the dread and unknown factors.

Importance of Understanding Risk Perception

Understanding the audience's risk perceptions is crucial because it allows for the creation of customised messages that resonate with the audience, making communication more relevant and efficient. Transparent communication will help to develop trust and credibility with the audience. Providing balanced and thorough information will help them to make informed decisions about adopting or rejecting the technology. Finally, collecting audience feedback will make them feel heard, resulting in higher engagement and adoption rates.

B2

Introduction

Smoking continues to be one of the leading causes of preventable diseases and premature deaths worldwide. This is because it is linked with serious health issues such as cardiovascular diseases and various types of cancer (World Health Organisation, 2021). It also puts a huge burden on the healthcare and IT sectors because it increases medical costs and reduces productivity (Centres for Disease Control and Prevention, 2020). Despite the highly cost-effective and efficient treatments to cure tobacco addiction, the participation rate is low as only ~5% of smokers who are trying to quit enroll in these programs (Zhu et. al, 2000).

Existing research has revealed that providing smokers with financial incentives has resulted in increased participation in smoking cessation therapies and short-term cessation rates, but it does not significantly impact long-term cessation rates (Volpp et. al, 2006).

This section will deal with designing a study to assess the efficiency of a company program aimed at reducing the smoking habits of employees by offering them cash incentives to quit smoking for 6 and 12 months.

Elements of the Research Design

<u>Primary Research question</u>

Does providing cash incentives to employees significantly decrease smoking behaviours in employees?

<u>Secondary Research question</u>

What are the factors that significantly affect the efficiency of the cash incentive program?

Independent variables

These variables are not affected by any other variables and are used in estimating a particular outcome. These can be controlled by the researcher. In our case, they could be as follows:

- The smoking cessation program – It will have two levels, one with the presence of the program (intervention group) and the other with the absence of the program (control group).
- Demographic variables like gender, age, education and income (Lynagh et. al, 2012).
- Variables capturing participants' smoking details like the number of cigarettes smoked per day, number of years smoked, longest layoff period, and health status (Volpp et. al, 2006).
- Variables capturing social characteristics like whether the participant's family members or partner smokes (Lynagh et. al, 2012).

Dependent variables

These are variables which are being measured in the research. The outcome of these variables is not under the researcher's control. In our case, they might be the following:

- Quit rate: the percentage of employees who refrain from smoking during the evaluation period (6 months and 12 months).
- Loss to follow-up rate: this is the percentage of employees who quit before finishing the programme.

Methodology

Study Design

A Randomised Controlled Trial (RCT) will be conducted. It is a technique where the participants are randomly divided into different groups, where one group (known as the treatment group) receives the intervention being tested while other groups (control groups) receive alternate or no treatment. This gives each participant an equal chance of being assigned to any group, thus reducing the biases and ensuring that any differences observed between the groups are likely because of the intervention given rather than other factors (Piantadosi, 2017).

Sampling

All the employees of the company who identify themselves as smokers along with those who express willingness to quit will be invited to participate. A random sampling technique will be utilised to ensure representativeness.

Procedure

Employees can be informed of the study through email, memos, company-wide posters and website publicity. Interested employees can go through an informative session and fill out consent forms explaining study details and procedures. A questionnaire for collecting demographics and smoking data could be distributed afterwards.

Eligible employees will be randomly assigned to the intervention group (receiving cash incentives) and the control group (no cash incentives) having equal sizes. This will ensure all participants are at the same level with minimal pre-existing differences which might influence the results. The intervention group will participate in the smoking cessation program. Follow-up assessments will be conducted after 6 months and 12 months to calculate the quit rate and loss to follow-up rates in both groups. This will help in estimating the effectiveness of the company program. To ensure the accuracy and reliability of results, smoking status will be measured through scientifically validated methods such as saliva or urine cotinine tests (Volpp et. al, 2009). Employees who did not smoke for 6 months get £400 while those securing 12 months get £700.

Individual differences in play

These are characteristics (physical or mental) which differentiate one person from another. One of the important individual dependence variables which could significantly affect the results is Nicotine Dependence, which is a severe addiction to tobacco products caused by the chemical nicotine, causing the victim to experience strong cravings and withdrawal symptoms. This can lead to:

- **Fewer participation**: Employees with high dependence may resist participation due to weak motivation.
- **Lower Quit Rate**: The program's effectiveness may be reduced because those with severe dependency may struggle more with quitting compared to those with lower dependence.
- **Higher Relapse Rate**: Participants with high dependence may manage to quit smoking during the assessment period but will more likely give in later due to stronger nicotine cravings.

Methods of Communication

The following methods could be used:

- **Customised messaging**: For people who are heavily dependent on nicotine, stress the long-term health benefits of quitting over the short-term cash gains. Along with the programme, offer them extra help by providing services like free therapy to help them quit smoking.
- **Pay attention to the stages of change**: people go through different steps when they are ready to quit smoking, such as pre-contemplation, contemplation, preparation, action, and maintenance.
- **Buddy System:** Create a buddy system where employees can connect with a partner who successfully managed to quit smoking. This would provide support and encouragement.

By considering individual differences like nicotine dependence and tailoring communication accordingly, the program can be more effective in promoting smoking cessation across a wider range of employees.

References

1. Centers for Disease Control and Prevention (2020) 'Smoking & tobacco use', CDC.gov. Available at: https://www.cdc.gov/tobacco/data_statistics/fact_sheets/fast_facts/index.html.
2. Fischhoff, B., Slovic, P., Lichtenstein, S., Read, S., & Combs, B. (1981). How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. Policy Sciences, 14(2), 127-152.
3. Folkard, S., Tucker, P. (2003). Shift work, safety and productivity. Occupational Medicine, 53(2), 95–101.
4. Gentner, D. and Stevens, A.L., 1983. Mental Models. Hillsdale, NJ: Lawrence Erlbaum Associates.
5. James Clear. (n.d.). Mental Models: Learn How to Think Better and Gain a Mental Edge. [online] Available at: https://jamesclear.com/mental-models#:~:text=A%20mental%20model%20is%20an.
6. Kasperson, R. E., Renn, O., Slovic, P., Brown, H. S., Emel, J., Goble, R., ... & Ratick, S. (1988). The social amplification of risk: A conceptual framework. Risk Analysis, 8(2), 177-187.
7. Kuhberger, A., & Weber, M. (2007). Perceived risk, procedural fairness, and public acceptance of nuclear energy: A psychometric analysis of the psychometric analysis of the Standard Eurobarometer surveys. Journal of Risk Research, 10(4), 461-482.
8. Lynagh, M., Bonevski, B., Sanson-Fisher, R., Symonds, I., Scott, A., Hall, A. and Oldmeadow, C., 2012. An RCT protocol of varying financial incentive amounts for smoking cessation among pregnant women. BMC public health, 12, pp.1-8.
9. Morgan, G.M. and Al, E. (2002). Risk communication: a mental models approach. Cambridge: Cambridge University Press.
10. Morgan, M.G., Fischhoff, B., Bostrom, A., and Atman, C.J., 2002. Risk Communication: A Mental Models Approach. Cambridge: Cambridge University Press
11. Olson, J.A., Artenie, D.Z., Cyr, M., Raz, A. and Lee, V., 2020. Developing a light-based intervention to reduce fatigue and improve sleep in rapidly rotating shift workers. Chronobiology international, 37(4), pp.573-591.
12. Piantadosi, S. (2017). Clinical Trials: A Methodologic Perspective. John Wiley & Sons.
13. Slovic, P. (1987). Perception of risk. Science, 236(4799), 280-285.
14. Volpp, K.G., Gurmankin Levy, A., Asch, D.A., Berlin, J.A., Murphy, J.J., Gomez, A., Sox, H., Zhu, J. and Lerman, C., 2006. A randomized controlled trial of financial incentives for smoking cessation. Cancer Epidemiology Biomarkers & Prevention, 15(1), pp.12-18.
15. Volpp, K.G., Troxel, A.B., Pauly, M.V., Glick, H.A., Puig, A., Asch, D.A., Galvin, R., Zhu, J., Wan, F., DeGuzman, J. and Corbett, E., 2009. A randomized, controlled trial of financial incentives for smoking cessation. *New England Journal of Medicine*, *360*(7), pp.699-709.
16. World Health Organization (2021) 'Tobacco', WHO.int. Available at: https://www.who.int/news-room/fact-sheets/detail/tobacco.
17. Zhu, S.H., Melcer, T., Sun, J., Rosbrook, B. and Pierce, J.P., 2000. Smoking cessation with and without assistance: a population-based analysis. American journal of preventive medicine, 18(4), pp.305-311.