



Deliverable 6.7

Radon Health Communication

Work Package 6



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Executive Summary

This deliverable reflects the PhD Dissertation: (In)visible and (in)vincible? Designing theory-based, evidence-based, and strategic communication materials to increase radon protection intentions. While this dissertation is published under embargo until March 2026, this deliverable provides a short summary of the thesis and the abstracts of the different chapters.

Radon, a naturally occurring radioactive gas, is the second leading cause of lung cancer worldwide. Despite the severe health risks, radon testing and mitigation remain insufficient. This issue is situated on multiple levels, ranging from the individual to the political, economic, social, and physical environment. While effective communication is essential to bridge this gap, radon health communication remains underexplored. This dissertation examines how strategic, theory- and evidence-based communication can enhance public engagement with radon-related behaviours.

In the first phase of this research, the current communication was analysed. A systematic review of radon-related mass media interventions reveals that most campaigns rely on informational messaging, often failing to evoke personal relevance or emotional engagement. Moreover, in focus group workshops homeowners emphasised the need for communication strategies that extend beyond awareness-raising, addressing practical concerns such as financial support and regulatory measures. Participants also suggest tailoring messages to different behavioural stages, using approaches such as humour, personal letters, and testimonials.

In the second phase, communication materials were developed and tested. An online experiment compared the impact of narrative-based and statistical messages on risk perception and behavioural intentions. Findings indicate that narratives are more effective in increasing personal and general risk perception while also strengthening intentions to seek information, test for radon, and consider mitigation. These results inform the development of a large-scale social media campaign, *Radon Buster*, designed to motivate individuals to take action. The campaign, implemented across Austria, Belgium, Ireland, and Slovenia, uses Facebook ads incorporating narratives, humour, and social norm nudges to attract attention and drive engagement. A controlled online survey experiment finds that exposure to these ads positively influences information-seeking intentions. A subsequent live Facebook study demonstrates strong audience engagement, with click-through rates and interaction metrics suggesting that social media can serve as an effective platform for radon risk communication.

Overall, the findings highlight that radon communication must go beyond merely providing information, but should engage audiences, and align the messages with the decision-making process. While no one-size-fits-all solution exists, integrating social, emotional, and cognitive factors can enhance the effectiveness of communication strategies. This dissertation underscores the importance of a multi-level approach, combining stakeholder-targeted messaging with broader environmental interventions to ensure radon risk communication translates into meaningful action.

The whole dissertation can be found at: <https://doi.org/10.63028/10067/2122950151162165141> from April 2026.

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Introduction

The structure of this dissertation is aligned with the PRECEDE-PROCEED model, as shown in Figure 1. In PART 1: PRECEDE, the focus is on understanding the issues related to radon. Chapter 1 is dedicated to the needs assessment, which is divided into four sections. The first section, the health assessment, delves into the issue of radon exposure, examining its significance as a public health concern and its impact on the population and the quality of life. Following this, the behavioural assessment section explores the (lack of) behaviours contributing to radon exposure, investigating the challenges associated with changing these behaviours and identifying key determinants of behaviour. The environmental assessment then examines the role of the physical, social, political, and economic environment in either reinforcing or enabling radon-related behaviours. Finally, the section about the interventions reviews existing interventions aimed at reducing radon exposure and identifies gaps that need to be addressed to improve public health outcomes.

Chapter 2 presents a systematic review of mass media interventions related to radon. This chapter seeks to identify the needs and best practices for future mass media campaigns by analysing existing literature. The review highlights the gaps in the current campaigns and offers recommendations for designing more impactful communication strategies in the future. Chapter 3 involves a co-designing study that explores the barriers and facilitators related to radon testing and mitigation. This chapter is based on workshops conducted with locals with radon experience, providing insights into their experiences and the role of communication in these experiences.

In PART 2: PROCEED, the dissertation moves into the implementation and evaluation phases of the PRECEDE-PROCEED model. Chapter 4 documents the first experiment where developed communication materials are tested, focusing on comparing current communication approaches to testimonials. Finally, Chapter 5 continues with the development of communication materials, this time not only testing them in a controlled experimental study, but also in a real-world context. This chapter evaluates the performance of the intervention in a natural setting, providing insights into its feasibility, acceptability, and impact on the target population.

Finally, the Discussion (Chapter 6) will tie back to the PRECEDE-PROCEED model.

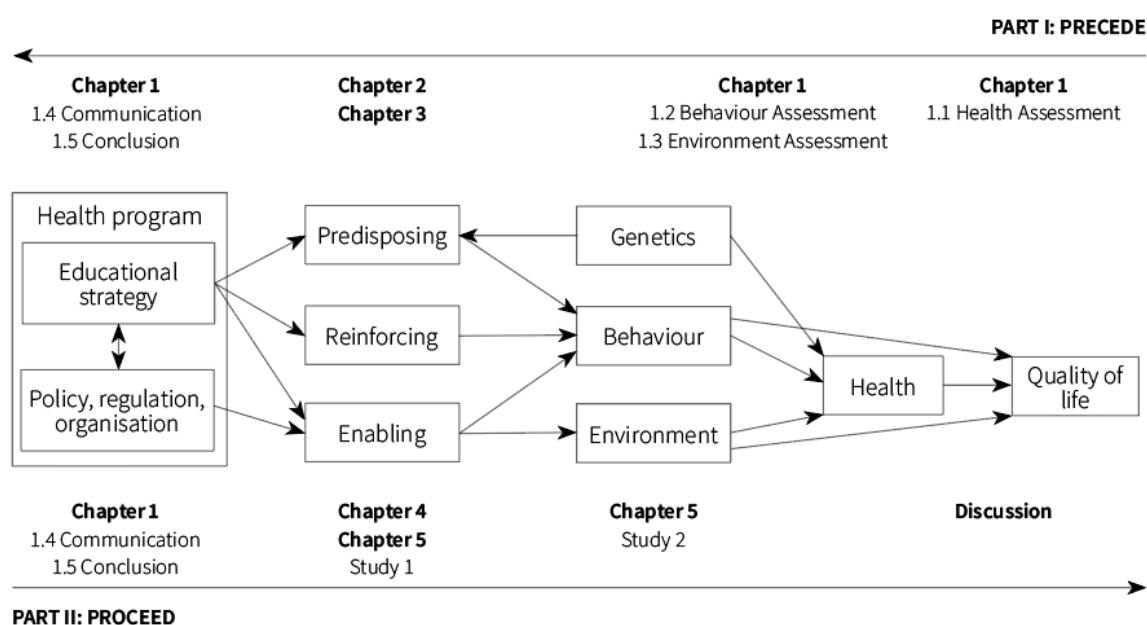


Figure 1: Overview of dissertation

1. Chapter 1: Needs Assessment

Radon, a naturally occurring radioactive gas, is the second leading cause of lung cancer worldwide. Despite the severe health risks, radon testing and mitigation remain insufficient. This issue is situated on multiple levels, ranging from the individual to the political, economic, social, and physical environment. While effective communication is essential to bridge this gap, radon health communication remains underexplored. This dissertation examines how strategic, theory- and evidence-based communication can enhance public engagement with radon-related behaviours.

In the first phase of this research, the current communication was analysed. A systematic review of radon-related mass media interventions reveals that most campaigns rely on informational messaging, often failing to evoke personal relevance or emotional engagement. Moreover, in focus group workshops homeowners emphasised the need for communication strategies that extend beyond awareness-raising, addressing practical concerns such as financial support and regulatory measures. Participants also suggest tailoring messages to different behavioural stages, using approaches such as humour, personal letters, and testimonials.

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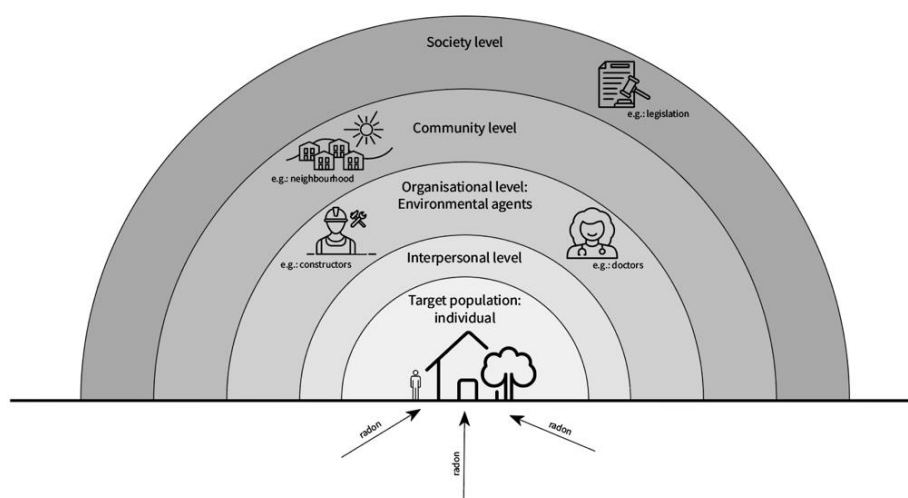


Figure 2: Ecological model applied to radon

2. Chapter 2: Clearing the air

Abstract

Indoor radon is a natural radioactive gas that enters homes through cracks in the foundations. It is one of the leading causes of lung cancer. Although radon can be detected with an indoor radon test and can be mitigated by means of either ventilation or professional measures, testing and mitigating rates of the at-risk population remain insufficient. The objective of this study is to systematically review the current level of evidence regarding the design and effectiveness of mass media campaigns to address the health risks of indoor radon to homeowners. The results show that informative tone of voices prevailed, other components, such as emotional or social components were often not included. Furthermore, the focus was mostly on intention and less on behaviour itself, and on testing instead of mitigation. Further research is needed to test effective and innovative communication strategies to increase protective behaviour concerning indoor radon.

Published as: Apers, S., Vandebosch, H., & Perko, T. (2023). Clearing the air: A systematic review of mass media campaigns to increase indoor radon testing and remediation. *Communications*, 49(1), 144-165. <https://doi.org/10.1515/commun-2021-0141>

3. Chapter 3: Co-designing communication

Abstract

Indoor radon is a natural radioactive gas and is one of the leading causes of lung cancer. Despite multiple policy and communication interventions to increase radon testing and mitigation, the uptake of these measures remains insufficient. A participatory research design was applied in Belgium and Slovenia to probe the barriers and facilitators homeowners experience regarding radon protective behaviour on the one hand and co-designing communication tools on the other hand. The results show that there remains a need for interventions on all levels (i.e., policy economic interventions, and communication). Moreover, results indicated a need for a communication strategy that follows the different steps between awareness and performing mitigation measures. Further, involving the target group in the early stages of intervention design was beneficial. Future research is needed to test the effectiveness of the proposed communication strategies in a controlled setting.

Published as: Apers, S., Vandebosch, H., Perko, T., & Zeleznik, N. (2023). Co-designing communication: A design thinking approach applied to radon health communication. *International Journal of Environmental Research and Public Health*, 20(6), 4965. <https://doi.org/10.3390/ijerph20064965>

4. Chapter 4: Facing the Facts

Abstract

Radon poses a significant health risk when present indoors. It is the second leading cause of lung cancer, after smoking. Effective communication strategies are essential for raising awareness about radon and encouraging individuals to test and mitigate. However, current approaches, which primarily focus on statistical information, have not proven sufficiently effective. The aim of this study was therefore to assess the impact of narratives – compared to statistical texts - on personal and general risk perception and intentions to adopt radon protective behaviour. Additionally, the mediating role of psychological distance was investigated, building on the risk convergence model. Using a between-subject design, an online experiment was conducted with three conditions: a narrative condition (N = 134), a statistical condition (N = 138), and a control condition (N = 145). The study revealed that narratives are effective in influencing personal and general risk perception. They also played a pivotal role in encouraging behavioural intentions, such as the intention to seek information, intention to test and mitigate. This underlines the importance of different communication strategies in shaping risk perception and behavioural intent. These findings contribute to the development of more effective communication strategies for reducing radon-related health risks and enhancing overall public health.

This chapter is submitted for publication and under review (3rd round) in European Journal of Health Communication as: Apers, S., Vandebosch, H., & Perko, T. (date). Facing the facts: Exploring narrative vs. statistical communication strategies for enhancing radon risk perception and promoting radon protective actions.

5. Chapter 5: From Attention to Intention

Abstract

This study investigates the effectiveness of different social media communication strategies in promoting radon information-seeking behaviors and intentions to test for radon. Guided by the Elaboration Likelihood Model, the study explores the interaction between the peripheral and the central routes of persuasion in promoting radon protection behaviors across four European countries: Austria, Belgium, Ireland, and Slovenia (N = 1,677). The “Radon Buster campaign”, containing Facebook advertisements based on narratives, humor, and norm nudges, and a website, was developed for this study. An online survey experiment evaluated the impact of the Facebook advertisements on radon information-seeking intentions and the impact of the website on radon testing intentions. Participants were randomly assigned to one of four conditions: narratives, humor, norm nudges, or a control group, followed by interaction with the website. The results show a direct positive effect of the exposure and appreciation of the posts on information-seeking intentions. However, mixed effects were found regarding the moderation of website appreciation and counterarguing on the effect of the website on the intention to test. Overall, the findings underscore the importance of engaging communication strategies that are designed to evoke both peripheral and central route processing to effectively promote radon awareness and testing behaviors.

Study 1 in this chapter is based on a manuscript submitted for publication and under review (3rd round) in Journal of Health Communication as: Apers, S., Symons, M., Vandebosch, H., & Perko, T. (date). From attention to intention: Evaluating the effectiveness of social media and website strategies in the Radon Buster Campaign.

6. Discussion

Making the invisible visible and the invincible vincible has been the primary motivation throughout this research. This – more metaphorical – motivation has translated into the objective of designing theory-based, evidence-based, and strategic communication materials to increase radon intentions. Theory-based because it grounds the communication materials in behavioural change models, ensuring that the strategies are not intuitive but built upon established psychological mechanisms. Evidence-based because the communication materials stem from empirical findings, both from existing literature and the original research conducted in this dissertation. It is strategic because the intervention was designed with clear objectives of reaching homeowners at the right time, using behavioural change techniques and strategic channels to maximise the impact and engagement. Before delving into the broader interpretation of the results, a brief summary of the thesis is provided based on the PRECEDE-PROCEED model.

In the first part of the dissertation, the PRECEDE part, we sought to understand radon, and, more specifically, the related issues concerning health, individual behaviour, the environment, and communication. Subsequently, this part was guided by the following three research questions: (1) How can mass media intervention programs promote radon-related healthy behaviours amongst the residential population, by changing their personal determinants? (2) What are the main barriers and facilitators to engage in radon-protective behaviour experienced by homeowners, and how are these addressed in current interventions, if at all? (3) How can the communication about radon be improved to be more relevant and engaging for the target group?

First of all, the social assessment, as presented in Chapter 1, emphasised how radon action needs to be taken to optimise the quality of life. We also investigated the epidemiological, behavioural, and environmental assessment and identified radon as one of the main causes of lung cancer. We found that there is a gap between the desired behaviour and the actual behaviour and that environmental action is still insufficient. Looking at the educational and ecological assessment, we identified behavioural and environmental determinants. Predisposing factors related to the cognitive determinants identified in Chapter 1, such as knowledge, attitudes, risk perceptions, self-efficacy, response-efficacy, and social norms. In Chapter 4, we also distinguished between personal risk perception and general risk perception as predisposing factors. Regarding reinforcing factors, we could not identify direct factors for the at-risk individuals; more indirect factors include stigma, or financial reimbursements. In Chapter 1, we also discussed how European Member States are legally obliged to implement their radon action plans, which is a reinforcing factor on a higher level. Regarding enabling factors, we already specified in Chapter 1 how legislation, access to resources, free tests, and environmental changes can facilitate behaviour. Moreover, in Chapter 3, enabling factors also included the standardisation of measures to ensure quality, stakeholder communication, and general communication. Regarding administrative and policy assessment and intervention alignment, multiple suggestions regarding interventions are proposed, mostly focused on the results of Part 2: PROCEED.

Part 2 of this dissertation started from the evidence gathered in the first part and used behavioural change methods based on theory to develop more strategic communication materials. The following research questions were the basis of the experimental studies that evaluated the developed communication materials: (4) How do narratives and statistical texts compare in influencing personal and general risk perception and the intention to adopt radon-related behaviours? (5) How effective is a campaign strategy, based on the central and peripheral pathways of the Elaboration Likelihood Model, in motivating individuals to seek additional information and test for radon across different European countries? As this dissertation focused on designing and testing communication materials, only process evaluation was discussed in Chapters 4 and 5.

The most important findings, along with their implications for health and quality of life, theory, and practice as well as their broader relevance to health and risk communications, the limitations and areas for future research can be found in the full dissertation.