

Never too old to learn

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Impact of this dissertation



Older adults are overrepresented in statistics on fatal residential fires and injuries which makes them an important target group for fire safety programmes. Therefore, the aim of this dissertation was to develop a behavioural intervention to improve home fire safety behaviour among older adults by using Intervention Mapping.

The findings from the different studies showed that older adults have limited knowledge about fire safety (Chapter 2). Furthermore, we found that perceived behavioural control, attitude and response efficacy are important target variables for fire safety programmes (Chapter 3). These results were used as input for the development of the Fire Safety at Home programme (Chapter 4). An effect study (Chapter 5) showed positive intervention effects of this programme for different fire safety behaviours related to common fire causes among older adults (connecting power strips, placing a phone or iPad on a sofa or chair while charging, and cleaning the dryer lint filter), the social cognitive determinant attitude towards home fire safety, and risk perception towards cleaning the dryer lint filter after every cycle. These results underscore the importance of targeting specific behaviours and determinants in interventions for meaningful change in fire safety practices.

This dissertation broadens the field of fire safety research since this is one of the first studies that focuses on preventive fire safety behaviour. In general, current home fire safety programmes focus on either taking technical preventive measures, such as installing smoke alarms or carbon-monoxide detectors, or planning escape routes. However, since statistics show that behaviours such as cooking are common fire causes among older adults, it is needed to address these behaviours in research.

How the results of this dissertation will impact fire safety education, fire safety regulations, and managing residential buildings will be addressed in the following paragraphs.

Impact on fire safety education

The research as described in this dissertation started from a need for a scientific basis on which fire safety education in the Netherlands can be built. The fire service started organizing fire safety programmes following the example of (programmes in) the United Kingdom. At the start, trial and error was used to find out how a fire safety programme should be organized. Over the years, the importance of input from behavioural sciences has been increasingly recognized. In recent years, the fire service started hiring several behavioural experts and expressed their need for scientific support for their fire safety programmes. This need was supported by the Dutch Burns

Foundation. This dissertation has met those needs by scientifically examining how to develop, implement and evaluate fire safety programmes for older adults.

Furthermore, this dissertation focuses on fire safety behaviours as well as underlying social cognitive determinants. This contributes to a better understanding of fire safety behaviour among older adults. These insights are useful for stakeholders that organize fire safety programmes for this target group such as the fire service, Dutch Burns Foundation, Dutch Burn Care professionals, housing companies, Associations of Owners or (home) care workers. First, by understanding the fire safety behaviour of older adults, choices can be made about which topics to address in fire safety programmes. Second, insights into underlying determinants provide information about how to motivate older adults to improve their fire safety behaviours, and can help in making decisions about which behaviour change methods to use in fire safety programmes.

In addition, the studies described in this dissertation examined how to systematically develop a fire safety programme for older adults. Therefore, the findings of this dissertation are of interest to stakeholders that develop fire safety programmes. This dissertation showed that systematically developing an intervention that targets specific fire safety behaviours, leads to a greater effect in positively influencing these behaviours, overall attitude towards fire safety, and risk perceptions. For meaningful change in fire safety practices, developers must develop fire safety programmes in a systematic way.

In this dissertation, the protocol that was used to systematically develop a fire safety programme for older adults is Intervention Mapping. Intervention Mapping can be used to develop a theory- and evidence-based intervention [9] and informs the implementation and evaluation of interventions. The studies in this dissertation showed that using Intervention Mapping can increase the effectiveness of a fire safety programme. Therefore, it is recommended to use Intervention Mapping in the development of new fire safety programmes. Intervention Mapping can also be used to assess and, if needed, modify current fire safety programmes. To our knowledge, the Intervention Mapping approach has rarely been used in the development of fire safety programmes. Only one study is known in which Intervention Mapping is used in prevention research into burns in young children. Therefore, this dissertation can be seen as a stimulus for the fire service and other stakeholders involved in the development of fire safety programmes to use Intervention Mapping in the future.

The results of the different studies from this dissertation have been shared with fire safety professionals at different international conferences such as the International Safety Education Seminar (2019, 2022 and 2023) and during the European Fire Safety Week (2020, 2021 and 2023). These presentations have led to interest from other fire prevention task areas (such as fire safety engineers) in addition to their mainly technical approach to fire safety.

Input for fire safety regulations

In practice, it is often assumed that technical measures ensure the fire safety in a building. Furthermore, fire safety regulations are based on desired behaviour (e.g. closing doors after leaving the fire room). Solely trusting on fire safety engineering is only possible if you make sure these technical measures are behavioural-independent or if you can influence behaviour of residents in such a way that they will always display the desired behaviour. However, not everything can be engineered, therefore influencing behaviour is important. This dissertation provides ingredients for 1) aligning regulations with behaviour of residents and 2) influencing their behaviour. To address the importance of influencing behaviour next to technical fire safety measures, the author of this dissertation was the first behavioural scientist to ever be invited at the annual Fire Safety and Science conference.

Escaping from a building is becoming increasingly difficult due to the flammability of materials and smoke propagation. Therefore, it is expected that in the future, the stay-in-place principle will become an important solution in residential buildings. However, this requires behaviour change: instead of leaving the building when there is a fire, residents will have to stay in their homes. This dissertation provides input for influencing behaviour by highlighting which possible factors (e.g. determinants) play a role in fire safety issues. The expertise of behaviour change, with associated advices arising from the studies in this dissertation, has been included in several other prevention studies from the Institute for Public Safety commissioned by the national government.

Managing residential buildings in the period of occupancy

Residents should not place materials in escape routes and have to know what to do in the event of a fire. Therefore, it is important that, in the period of occupancy, residential buildings have good fire safety management. Following several (fatal) fires, the National Research Council requested the Dutch government to support building owners with a guideline for the period of occupancy. For this reason, in 2023, the Netherlands Institute of Public Safety has drawn up a guideline for building managers. An important part of this guideline is providing fire safety education for residents. The lessons learned

from this dissertation (e.g. which determinants influence fire safety behaviour) are integrated in this guideline as input for building managers. Furthermore, the results of the different studies from this dissertation have been shared with building managers and housing associations at a symposium about building management during occupancy periods of residential buildings in 2023.

Activities

The results of the different studies of this dissertation have been presented at (inter)national conferences and trade journals for fire safety professionals and healthcare workers, and will be published in scientific journals. Furthermore, to translate the results of this study into practical advice about developing or improving fire safety programmes, presentations about the different studies have been given to the Community Fire Safety teams in different safety regions and to policy makers working for the fire service, housing corporations, care workers and Associations of House Owners. These presentations will continue to be given in the future on request. Furthermore, it will be explored what is needed to make the results and implications of the different studies available for both professionals as well as laypersons. For example, this dissertation will be translated into a public-friendly report. In addition, it will be explored if a web page can or online information video's can be created. The public-friendly report together with the online tools will serve as a guideline for professionals about how to implement lessons learned into their daily practices.

Impact on the target group

As statistics show, older adults are overrepresented in statistics on fire injuries and fatalities. The mortality rate among older adults increases even more with age, with a risk up to three times at 65 years or older compared with people younger than 65 years. This dissertation can help in improving fire safety among older adults and therefore decreasing the chance of them becoming a victim of residential fire. Ideally, we hope to make such an impact that the chances of older adults of becoming a victim of residential fires, will decrease from a factor 3 to a factor 1.5 or 1 in comparison with people younger than 65 years old.

Conference presentations

1. International Safety Education Seminar, Linz, Austria (2023)
2. European Fire Safety Week, webinar (2023)
3. Conference 'Behaviour change and fire safety', Amersfoort, the Netherlands (2023)
4. Fire Safety and Science congress, Arnhem, the Netherlands (2023)
5. Symposium on fire-safety management in occupancy periods of residential buildings, Arnhem, the Netherlands (2023)
6. Dutch Fire Safety Week, Arnhem, the Netherlands (2023)
7. Conference 'Behaviour change and fire safety', Culemborg, the Netherlands (2022)
8. International Safety Education Seminar, Dublin, Ireland (2022)
9. Dutch Association for Burn Care, Groningen, the Netherlands (2022)
10. European Fire Safety Week, webinar (2021)
11. Fire Safety and Science congress, webinar (2021)
12. European Fire Safety Week, webinar (2020)
13. International Safety Education Seminar, Antwerp, Belgium (2019)
14. Fire Safety and Science congress, Arnhem, the Netherlands (2019)

Contribution of this dissertation to research reports

1. Netherlands Institute for Public Safety (2023). *Guidelines for fire-safe management of residential buildings*. Arnhem: Netherlands Institute for Public Safety.
2. Netherlands Institute for Public Safety (2022). *Smoke propagation and personal safety*. Arnhem: Netherlands Institute for Public Safety.
3. Dutch Fire Service Academy (2022). *Preliminary study into single escape routes in residential buildings*. Arnhem: Netherlands Institute for Safety.

