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Egressibility – Accessible Fire Evacuation for All

By: Erik Smedberg^a, Enrico Ronchi^a, Gunilla Carlsson^b, Giedre Gefenaite^b, Steven M. Schmidt^b, Björn Slaug^b

^aDivision of Fire Safety Engineering, Lund University, Sweden

^bDepartment of Health Sciences, Lund University, Sweden

Most evacuation strategies rely on the abilities of occupants to self-evacuate. Decreasing functional capacity, which often overlaps with older age, leads to decreased ability to self-evacuate in case of fire. That is unless the building is designed to accommodate the needs of people with lower functional capacity. Functional capacity refers to the abilities to perform fundamental everyday activities such as seeing, hearing, moving around, etc., while a decrease in functional capacity is referred to as a functional limitation.

Through the years, accessibility to the built environment has increased, and accessibility is now seen as an integral part of building design. Increased accessibility means that now more than ever, the functional capacity of the people occupying and using public buildings worldwide has become much more diverse. Furthermore, globally the population is ageing, inevitably leading to higher prevalence of people living with functional limitations.

Research on fire safety and accessibility has often focused primarily on challenges related to the needs of people who use wheelchairs [1]. However, functional capacity can be limited across many other domains of human functioning, such as cognition, vision, and hearing. Moreover, functional limitations can be viewed as a continuum [2], meaning that people with a specific functional limitation may experience very diverse challenges.

To highlight the specific challenges for evacuation design related to people with functional limitations, the term ‘egressibility’ has been proposed [3]. The term in itself mirrors the term of accessibility but puts the emphasis on the environments and activities relevant for evacuation. It is argued that egressibility should not only focus on measuring the evacuation capabilities of people with functional limitations but should also (or primarily) focus on making the design of the environment usable and safe for people with diverse abilities. In accessibility research, a useful model to understand issues of accessibility is the person-environment fit model [4]. This model can be applied to egressibility as well. The model describes the interaction between functional capacity and the demands from the environment. In general terms, higher functional capacity means that you can withstand higher environmental demands, whereas people with lower functional capacity might have issues to self-evacuate when the environmental demands are high. For example, a stair poses

demands on people for them to make use of it. In some cases, the functional capacity is too low to manage the demands. If a person uses a wheelchair, the stair is referred to as an environmental barrier in that the demands set forward are too high to overcome. A schematic representation of the interaction between functional capacity and environmental demands is presented in Figure 1. These concepts have been used to systematically link functional limitations and the activities needed for evacuation using the International Classification of Functioning, Disability and Health by the World Health Organization [5].

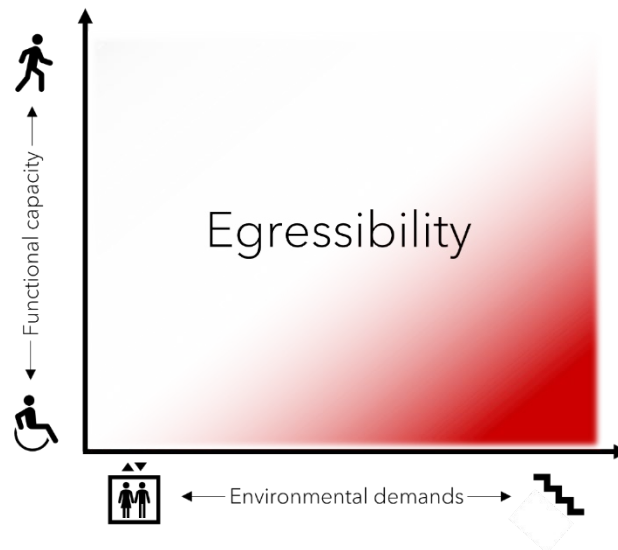


Figure 1: Schematic representation of egressibility for persons with mobility limitation. This includes the interaction between the personal and environmental components. The red area indicates when there is a mismatch between functional capacity and environmental demands, meaning that self-evacuation is difficult.

Recently, a new European standard (EN-17210:2021, *Accessibility and usability of the built environment - Functional requirements*) was published which incorporates fire safety as a part of accessibility. The standard highlights already known important aspects related to egressibility, but knowledge relating to accessible evacuation for all is still lacking.

A necessary step to improve egressibility involves investigating the perspectives of people with functional limitations on egressibility. In a recent study [6] interviews were conducted with older people with functional limitations in Sweden to develop an understanding of their perspectives on evacuation opportunities and related aspects of accessibility. Although the study participants did not have first-hand experiences of evacuation situations (or at least not at their current functional capacity), parallels to accessibility were often drawn. Experiences of inaccessibility may very well influence how a person with functional limitations conceives an evacuation situation. Prior to the interviews, the participants were asked to fill in a questionnaire regarding functional limitations. Among the participants, hearing impairments and functional limitations related to movement were most common.

The interview covered topics such as accessibility, egressibility, evacuation, assistance from other, and risk perception. Using a qualitative analysis method, three themes representing patterned meaning were generated from the interview answers.

Theme 1: Other people's difficulties in understanding

While most of us recognize that others may have different functional capacities, it can be difficult to understand the challenges that others face. In several interviews, we found that people with functional limitations described situations where others maybe tried to help but did not know how. One example was given by an older gentleman in a wheelchair, where others sometimes tried to hold doors or gates open for him, but instead blocked his passage so that he could not get through. The same man also told that he perceived that others showed more consideration towards him when he used his wheelchair compared to when he used a cane. It can be concluded that in evacuation situations, people sometimes rely on assistance from others. In those cases, it is imperative to know who might need assistance, and also how assistance is best afforded.

Theme 2: Strategies to cope with the limitation

People with functional limitations regularly face challenges while interacting with the environment, and they develop and use coping strategies to better navigate such interactions. Some strategies include making use of other senses if one is impaired. For example, people with hearing impairments stated that they may look at others to be informed of an emergency. A person who was blind said that he regularly used sounds and smells to orient himself. In the uncertain event of an evacuation however, many participants stated that they may have an ability to 'push through' or go beyond their normal abilities in order to evacuate. This could for example mean that a person in a wheelchair may decide to try to crawl down a staircase, or that a person who experiences pain in walking longer distances could do so if it was urgently necessary. It is however important to recognize that 'pushing through' is not always possible and may in some cases lead to serious adverse effects.

Theme 3: Uncertainty of evacuation

Most participants had never experienced an evacuation, especially not at their current functional capacity. This of course leads to a lot of uncertainty for people with functional limitations regarding how an evacuation situation may look, possible reactions, and how others will react. Many participants stated that they did not worry about evacuation, stating that they were not the kind of person being worried in general. Despite this, many participants saw themselves as more vulnerable to fires due to their age and functional limitations. Nonetheless, many participants were uncertain whether or not people around them would provide assistance during an evacuation, and that it may be difficult for them to evacuate if needed.

Conclusions

In summary, the results from the interview study showed that older people with functional limitations may be uncertain about whether the built environment and people around them would be supportive in case of evacuation. Instead, many would rely on their own ability to overcome challenges during an emergency. These findings highlight two important aspects to consider in fire evacuation design. Firstly, the design of the built environment should accommodate the evacuation needs of our increasingly diverse population to the extent that people can have confidence in their possibilities to self-evacuate, regardless of functional limitations. This paradigm shift is needed to ensure equal access to egress in public buildings, as merely relying on assisted evacuation procedures is not in line with current accessibility policies aimed at participation, regardless of functional limitations. Secondly, the strategies adopted by people with functional limitations to overcome daily challenges should be identified, considered, and incorporated in fire evacuation design. The current over-generalization concerning the needs of people with functional limitations should be substituted by a careful scrutiny of the individual challenges linked to the type of functional limitation(s) and an assessment of the associated consequences on fire evacuation.

Further information can be found in the Fire Safety Journal scientific article presenting the results of this interview study [6].

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