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Fighting fire with psychology:

Do fire prevention interventions apply theories of behavior-change?

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Abstract

Fire can pose a serious threat for life. Therefore, fire departments and prevention practitioners try to persuade the population to save their own lives by taking preventive steps. But how do they do that? *Method:* A review of the existing literature was undertaken. Specifically, electronic data bases were searched for interventions aimed at the prevention of fire and related injuries. To give an answer on the methods used by interventions, fifteen studies were retrieved that described an intervention program, its program parts and evaluated results. They were analyzed according to their theoretical fundament and methods of persuasion to give a broad picture of the fusion of practice and theory. Theories such as the Protection Motivation Theory and the Extended Parallel Processing Model provided the specific way of looking at and analyzing the interventions. *Results:* Only two interventions used theories of behavior-change as the architecture of intervention design and as evaluation concepts and measures. One used a combination of prevailed theories from health psychology and another was built on the Extended Parallel Processing Model. The remaining studies had no explicit reference to theories and methods of changing behavior. However, several concepts of the Protection Motivation Theory were found implicitly in all interventions; Severity and Vulnerability was most often covered by telling the causes, consequences and impacts of fire. Response costs were mostly decreased by giving-away free safety devices such as fire extinguishers, smoke alarms and safety kits. Efficacy-beliefs were increased by teaching behavioral skills, such as the maintenance of smoke alarms or the teaching of appropriate escaping behavior to children by means of virtual environments.

Abstract (Dutch)

Brand en vuur kunnen een ernstige bedreiging vormen voor het leven van mensen. Daarom proberen de brandweer en veiligheidskundige om de bevolking te motiveren hun eigen leven te redden door het nemen van preventieve maatregelen. Maar hoe doen zij dat? *Methode*: Een overzicht van de bestaande wetenschappelijke literatuur werd uitgevoerd. In het bijzonder werden de elektronische databanken doorzocht naar interventies gericht op de preventie van brand en aanverwante verwondingen. Om een antwoord op de toegepaste methoden te geven, werden vijftien studies gevonden welke een interventie programma en programma-onderdelen beschrijven en resultaten evalueeren. Ze werden geanalyseerd op basis van hun theoretisch fundament en methoden van overreding om daarmee een breed beeld te geven van de fusie tussen praktijk en theorie. Theorieën zoals de Protection Motivation Theory en het Extended Parallel Processing Model werden gebruikt als een soort ´bril´ om naar de interventies te kijken en deze te analyseren. *Resultaten:* Slechts twee interventies gebruikten theorieen van gedragsverandering als de architectuur van de interventie en als evaluatie concepten voor het meten van de effecten. Een interventie gebruike een combinatie van overheersende theorieën uit de gezondheidspsychologie en een andere interventie werd gebouwd op het Extended Parallel Processing Model. De overige studies hadden geen expliciete verwijzing naar theorieën en methoden van gedragsverandering. Er werden echter wel verschillende concepten van de Protection Motivation Theory impliciet gevonden in alle interventies; ´ernst´ en ´kwetsbaarheid´ was meestal gedekt door het vertellen van de oorzaken, gevolgen en impact van brand. ´Response-costs´ werden voornamelijk verminderd door het weggeven van veiligheidsvoorzieningen, zoals brandblussers, rookmelders en veiligheids kits. ´Efficacy-beliefs´ werden verhoogd door het leren van gedragsmatige vaardigheden, zoals het onderhoud van rookmelders of het onderwijzen van kinderen m.b.t. het juiste vluchtgedrag door middel van virtuele omgevingen.

1. Introduction

1.1. The fire hazard

Fire is a curse and a blessing at the same time. Seen from an evolutionary perspective, the first humans were able to colonize the colder continents by controlling fire. Controlled fire made living there possible and sufferable; it warmed the people, gave light and kept away dangerous animals and annoying insects. Crucial for survival, fire killed germs and made meat storable. It also extended the day, because by lighting campfires, humans could work, play and eat even after sunset.

While being of great importance for our ancestors and our society throughout history, fire also has a well-known tremendous destruction force. Survival was surely only possible by respecting and fearing fire. Otherwise, fire kills. Each year, burn injuries are experienced by 2.5 million people (Cobb, 1992). Figures from the United States show residential fires to cause 4045 deaths in the year 2000 while causing over $5 billion damage and losses (Karter, 2001). In 2006, 412500 residential fires were reported and resulted in 2580 deaths and 12925 injures. The caused damage is said to be nearly $7 billion in year 2005 (Karter, 2006). For Europe, a recent review showed that 4500 citizens lose their lives in the EU-27 and fire injuries represent six per cent of injury deaths, accounting for more than 240.000 deaths worldwide, every year (Benyi & Manti, 2008).

1.2. The risk factors

While a 40% decline in residential fire deaths is registered over the past two decades (Shults, 1998), a review of data and literature found that some population subgroups continue to represent a disproportionate percentage of fire deaths (Jones, 2001); being a man with low socioeconomic status and belonging to minority ethnic groups is associated with increased risk of fire death. The same is true for children in general. Each year, nearly 500 children die and 40.000 are injured in fires (Hwang, Duchossois, Gracia-Espana & Durbon, 2006). Children under 5 years have a 2.5 times higher risk of dying in a fire than any other childhood age group (Hwang et al, 2006) and most burn injuries occur at home (Cobb, 1992). For children aged 1 to 14, fires and burns at home are the leading cause of unintentional death (Runyan, 2005). Residential fires account for 90% of all childhood burn deaths (Mallonee, 2000); it is not always the burn itself but the poisoning effect of smoke inhalation (Baker, 1992).

Children are not only a group of fire victims, but at the same time a major group of perpetrators: Of every 100 people who die in fires in the United States, 16 are children. Of every 100 children who die in fires, 24 are killed because of children playing with fire. Of every 100 people who die in fires set by children, 85 are children (United States Fire Administration, 1988). In one study, over half of all asked elementary school children admitted having played with fire in their childhood (Franklin, 2002). Fires set by children resulted in 6215 deaths, 30.800 injuries and $11 billion damage in 1998 (Franklin, 2002).
Probably, children are at greatest risk for burn or fire injuries because their physical abilities, reasoning, and judgment are still developing (Atiyeh, 2008). Indeed, children with disabilities and cognitive limitations are more than twice as likely to die in a fire as a typical child (Injury Prevention for Children with Special Health Care Needs Work Group, 1999).

Likewise, older people are also disproportionally represented in fire death statistics; adults over 65 years have death rates more than three times higher than individuals younger than 65 (Ballesteros, Jackson, Maurice & Martin, 2005). Although representing only 12.5% of the US population, older people account for 35% of fire deaths occurring at home (Diekman, Huitric & Netterville, 2010). The risk even increases with age – persons older than 85 are 5.8 times more likely to die in a home fire (Centers for Disease Control and Prevention, 2006). This is especially alarming, because of the aging of population in general; by 2050, it is estimated that old people will become the U.S. nation´s largest group (Sengupta, Velkoff & DeBarros, 2005).

Comparable to kids with not yet fully developed cognitive abilities, old people are probably at such a high risk because of their degenerating sensory and cognitive abilities and progressing impairment in mobility (Sengupta et al, 2005).

1.3. The prevention movement

Fire departments and governments all over the world try to convince people to protect themselves, with smoke alarms being the most effective protective measure. Smoke alarms can cut the risk of dying in a residential fire by 50 to 80% (United States Fire Administration, 1982), by early providing warnings in the case of a fire. While statistics estimate the prevalence of smoke alarms to be nearly 90%, 25 to 34% of these alarms may be nonfunctioning (Smith, 1993) and 8 of 10 fire related deaths occur in houses without a functional smoke alarm (United States Fire Administration, 1990). The same study concluded that 60% of residential fire deaths occur in homes having no smoke alarms at all. Furthermore, households with nonfunctional smoke alarm outnumber those with no smoke

alarm (National Fire Protection Association, 2004). From a psychological perspective, this is rather alarmingly because humans may feel too safe while being actually in danger.

Until a few years ago, injuries were seen as acts of chance (Mondozzi & Harper, 2001). Preventing injuries by persuading humans to take protective measures is something parents know too well. Parents and ´behavior changers´ face one dilemma; while thinking knowledge should be sufficient to trigger self-protection, the scientific literature came to know that knowledge does not guarantee that an individual will really take action. The problem here is that increases in knowledge do not necessarily correspond to increases in behavioral skills (Knudson, Miltenberger, Bosch, Gross, Brower-Breitwieser & Tarasenko, 2009).

Nowadays, people realize the importance of prevention. It is a cost-effective strategy, because burns are preventable. Education can evoke awareness of dangers and teach people how to handle themselves in specific situations. The often deadly consequences of fire creates a dilemma; possible disfigurement and emotional traumas make clear that prevention messages should be unvarnished, but the question how one can ensure that people use this information in later situations remains open. Fire educators and fire fighters play a crucial role; being a credible and influential source, they are in a unique position to change people´s knowledge and behavior (Hazinski, 1993). Risk factors can be identified and educational strategies implemented to reduce those risk factors. Obviously, education must be at the right level to make a difference. The earlier prevention and health promotion efforts are implemented in life, the more effective the results could be (Bartfay, 1994).

How can psychology contribute to this efforts in making the world and the own house a safer place? The answer is: by understanding the human being, his brain and its cognitions. As an example, psychologists came much to know by studying children. When they are young, they lack a sense of danger and awareness and poorly understand cause- and effect relationships (Dixon, 1992). Later, they become curious and experiment, without knowing the outcomes of some of these actions.

But why do so many people die, when listening to a prevention message is supposedly sufficient to know the danger? Why do people smash their smoke alarms at night, just to get rid of that annoying beep although smoke alarms are praised to save lives? Why do people smoke in their beds, when it is such a dangerous activity? Again, the answer is because we are humans, and humans can err.

1.4. The human behavior

The importance of looking at human behavior gets more and more obvious. Many fires are caused by human error or human intention, such as smoking and children playing with

matches. Considering human behavior is also crucial in combination with smoke alarms; in one prevention program giving away smoke alarms away with a 10-year battery, researchers found that only one-third of the alarms were still functional 8 to 10 years after installation (Jackson, 2010). One-third of the alarms were missing, and another third were present but not operable. Of these, only 43% had a dead battery; the remaining smoke alarms had batteries removed or physically damaged. From those smoke alarms with dead batteries, only 13% had the original battery. In other words, many removed the initial original battery. Providing unfortunately no further data on this, one can suppose that some may have followed another prevention measure and thusly changed the battery every year. The study concludes that many nuisance alarms during cooking or smoking led the residents to disable their smoke alarms. This is a direct call for user-centered designs of smoke alarms and also interventions, raising the question how smoke alarms should look and work like and how they should be distributed. We cannot expect that humans will solely take preventive measures for all existing dangers. They must be ´nudged´ in the right direction. Interestingly, in one study that gave away coupons for free smoke alarms, half of the participants did not exchange it (Harvey, 2004). This is in sharp contrast to another distribution method followed in the same study, namely a door-to-door direct installation of smoke alarms, resulting in a 90% rate of present and working smoke alarms. Nevertheless, another study suggests that giving away smoke alarms may "waste resources and be of little benefit unless alarm installation and maintenance is assured" (DiGuiseppi et al, 2002, p. 3). The author concludes that the method of only giving away smoke alarms is unlikely to reduce injuries related to fire, because instructions may be not read due to poor comprehension or lacking skills. With smoke alarms installed on ´incorrect´ places (such as near cooking smoke), nuisance alarms may consequently lead to intentionally disabling the whole smoke alarm (DiGuiseppi, 1999). This action would lead a person to great danger and risk, because in case of a fire, the smoke alarm would not help the person in its psychological perception of the situation. In other words, the sounds of the alarm would not ´cue´ the person that a fire is in progress and that steps to escape the danger should be initialized.

In becoming actually aware of an emergency situation, people usually think about what they should do. A decision to escape a danger will probably be based on how serious the person sees the risk, which in turn is based on the psychological perception of it. Therefore, psychological perception and cognition is critical to escape-time.

1.5. The human perception

Looking at overall perception processes of humans, detection and interpretation are crucial steps. Detection, as the process of receiving information, needs functional eyes for visual stimuli, ears for sensing sounds, nose and tongue to detect chemical stimuli and skin to notice pain and changes in temperature. Interpretation, in contrast, needs only the brain to match the detected stimuli with a stored pattern in order to recognize a dangerous situation. In this way, it is perfectly understandable that most people would not interpret a fire alarm immediately as a serious personal threat, because the normal experience is that of a false alarm. Besides, this process by which we detect and interpret is unequal when looking at the different population groups and target groups of interventions; whereas children lack this ability due to not existent experience, older people seem to be degenerating and decreasing on these abilities. Looking at overall escape behavior of humans, one can easily imagine factors that would impede and hinder a fast escape; people could try to verify the importance of the alarm, alert others, trying to verify if there is really a fire or not, among many other things. Therefore, emergency evacuation practices would help people to recognize the danger while decreasing unnecessary movements.

1.6. Risk psychology

The question how people perceive risk and dangers has created an own field within psychology; Risk Psychology tries to conceptualize our cognitions in the brain when faced with a risk. Since a long time, risk psychology knows too well our errors and biases in judging dangers. These biases are so common, that most people do not even consider or think about them. Considering these cognitive activities is crucial when it comes to perception.

Theories about brain-cognitions are an approach to represent, describe and explain our conscious and unconscious thoughts related to risk judgments. Therefore, theories have the potential to assist in designing ´working´ interventions, because by knowing the factors influencing specific fire-related behavior, interventionists are more likely to develop succeeding interventions.

1.7. The theories of behavior-change

There are different theories trying to conceptualize human cognition related to risk and health-promoting behavior. In Psychology, prevailed behavior-change theories are the ´Theory of Planned Behavior´ (Ajzen, 1985), the ´Health Belief Model´ (Rosenstock, 1974), the `Protection Motivation Theory´ (Rogers, 1975), the `Transtheoretical Model of Behavior

Change´ (Prochaska, 1977), the ´Social Cognitive Theory´ (Bandura, 1986) and the `Extended Parallel Processing Model` (Witte, 1992).

In the following, the theories will be briefly summarized by mentioning the key-constructs. Finally, their empirical evidences will be presented to underpin their practical value.

In the ´Theory of planned behavior´, the core assumption is that ´intention´ is the best predictor of planned behavior. ´Intention´, as defined in the theory, can be seen as a person´s readiness to perform a specific behavior. In turn, this intention is determined by three additional factors; (1) the ´attitude´ towards performing the behavior in question, which can be seen as an evaluation of expected outcomes, (2) the ´subjective norms´, a belief about how other important people will think about a given behavior, and (3), the ´perceived behavioral control´, defined as a people´s perception of being able to perform the behavior in question. This third factor exerts its influence not only on the behavioral intention, but also directly on the behavior itself. To conclude in the developer´s own words, "the more favorable the attitude and the subjective norms, and the greater the perceived control the stronger should be the person´s intention to perform the behavior in question (Ajzen, 1985).

In a meta-analysis of 185 studies using this theory, Armitage and Conner (2001) found support for the efficacy of the theoretical constructs in predicting intention and behavior. Attitudes, social norms and perceived behavioral control were able to explain 39% of the variance of intentions and 27% of behavior.

The `Health Belief Model´ states that the willingness to change a health behavior is influenced by four factors; (1) the ´perceived susceptibility´, the perception that a health problem is personally relevant, (2) the ´perceived severity´, the perception of a problem and its consequences as serious, (3) the ´perceived benefits´ of following a recommended treatment, and (4), the ´perceived barriers´, an anticipation of costs related to following a treatment. This theory recognizes that wanting to change a behavior is not always enough to actually persuade people to do it. Therefore, it incorporates two additional factors, namely (5) the ´cue to action´, defined as external events that prompt a desire to make a health change, and (6), the person´s ´self-efficacy´, its belief in having the ability to make a change.

Carpenter (2010) accomplished a meta-analysis of 18 studies using this theory and found that severity, barriers and benefits were weak to moderate predictors of the likelihood to perform a target behavior. Benefits and barriers were better in predicting behavior in prevention studies rather than in studies analyzing behavior with existing diseases.

The `Protection Motivation Theory´ assumes that the ´motivation to protect´ is influenced by four factors; (1) the ´perceived severity ´ of the threat, defined as the degree of harm caused by the threat, (2) the ´perceived vulnerability´, defined as the probability of experiencing the threat, (3) the ´response efficacy´, seen as the effectiveness of the recommended response in preventing and removing the threat, and (4), the ´response costs´, which are those costs of following the recommended response.

A meta-analysis by Floyd, Prentice-Dunn and Rogers (2000) identified 65 studies and found the theoretical concepts to be useful for interventions. As predicted, severity, vulnerability, response efficacy and self-efficacy facilitated adaptive behavior, and decreases in intrinsic rewards and response costs likewise increased adaptive behavior.

The `Transtheoretical Model of Behavior Change´ classifies a willingness to change a behavior into five steps; (1) the ´precontemplation´, where people are not intending to take action in the near future, (2) the ´comtemplation` in which people are intending to change in the near future, (3) the ´preparation´, where people prepare to initiate steps or already have a concrete plan, (4) the ´action´ stage, in which people have indeed recently changed their behavior and (5), the ´maintenance´ stage, where the behavior in question is maintained for more than six months.

The TTM received only late attention. Therefore, no general meta-analysis is available. However, Marshal and Biddle (2001) found in a meta-analysis of the TTM in relation to physical activity and exercise that core constructs were indeed differing across stages.

In Bandura´s ´Social Cognitive Theory´, our functioning is an interplay between personal, behavioral and environmental factors. It has several key-concepts; (1) the ´behavioral capability´ represents knowledge and skills needed to perform a behavior, (2) the ´expectations´ or perceived outcomes of a behavior, (3) the ´expectancies´ representing the incentives or personal value of performing a behavior, (4) the ´self-control´ which regulates goal-directed behavior, (5) the ´observational learning´ concept, in which learning occurs while watching the actions of other´s behavior, (6) the ´reinforcements´ which increase or decrease the likelihood of a behavior through rewards and incentives, (5) the ´self-efficacy´, referring to a person´s confidence in being able to perform a given behavior, and (6) ,the ´emotional coping responses´, which are people´s strategies to deal with emotional stimuli.

The ´Extended Parallel Processing Model´ makes a division between two evaluations upon processing fear-arousing messages; at first, the threat gets evaluated by thinking about the ´perceived severity´ or the degree of harm and by thinking about the ´perceived susceptibility´ which is the subjective chance of being harmed by the threat. No constructive action is to be expected when these two factors are low. Secondly, in an evaluation of efficacy beliefs, the ´self-efficacy´ and also the ´efficacy of the recommended response´ in deleting a danger is critical. Only in combination with high efficacy beliefs do fear-appealing messages motivate to control the threat. Otherwise, they lead to ´fear control´, which is the attempt to only reduce the fear associated with a threat; by denying it ("I´m not at risk), by defensive avoidance ("It´s too scary and I don't want to think about it) or by reactance ("They want to scare me, I will ignore them").

A meta-analysis on the fear-appeal literature by Witte (2002) provided support for the persuasive effects of fear-appealing messages; the stronger the fear, the more persuasive they are. Indeed, fear seems to be a great motivator, but only as long as people believe in their ability to protect themselves.

1.8. Research Question

An important conclusion of one review of theoretical foundations of injury prevention programs is that only few injury prevention programs have used health behavior theories as a framework for prevention (Trifiletti, Gielen, Sleet, & Hopkins, 2005). This statement brings us directly to the scope and research question of this work:

Are prevailed theories of behavior-change used in fire prevention campaigns? If not explicitly, can theoretical constructs and concepts be identified when looking at the persuasive methods of fire prevention programs?

1.9. Importance of reviewing literature

On studying the existing scientific literature, practical implications can be derived by knowing ´what works´ and what does not. Many agents have tried their individual ideas, intuitions and assumptions in order to persuade humans to take preventive measures and motivate them to save their own lives. Only by aggregating the methods and results one is able to see and analyze common themes and succeeding methods.

2. Method

By looking on the theoretical fundaments of interventions, this systematic review of the literature is aimed at improving the evidence base on developing interventions focusing on the prevention of fire.

The specific objectives for the review were:

- To produce a systematic map describing the range of research on interventions implemented to help people to respond to fire,
- to produce a review of specific target-groups the interventions aimed at to identify mechanisms and effects the interventions had on them,
- to explore which ’mechanisms of change‘ might be important to underpin the practice of effective interventions, and
- to make recommendations for practice and policy based on these findings.

In order to ensure that the review was relevant to practice, it has been informed by a review group made up of one academic lecturer, one practitioner from the fire department, and the author. Their views informed the initial scope and direction of this review.

A first superficial search using the scientific database ´PsycInfo´ with the terms “fire education” or “fire prevention” yielded only very few articles. Therefore, it was chosen to not only include psychological perspectives and psychological databases on fire-research in order to achieve a broad, multidisciplinary collection of evidences.

Finally, the following databases were searched: ´Scopus´, ´Web of Science´, ´PsycInfo´ and ´Eric´. Strangely, there were few discrepancies and problems detected using these different databases. Some databases check whether the search term match those in the keywords-part of an article, some whether the search term is allocated within the whole text of a particular article and other databases look whether a search term is found in the topic.

These differences in usability are annoying and very likely to be a cause and reason of missed articles. Therefore, the author decided to broaden the search terms to “fire education”, “fire safety” and “fire prevention”, resulting in a huge amount of articles which were then filtered manually by reading each topic. The choice on these terms was based on common sense; the term ´fire´ should apparently always be existent in ´fire education´ or ´fire prevention´ programs. As follows, one gets many search results that do not fit the initial scope

of this work, but otherwise many suited articles could have been missed because many fire preventions could also be a part of an overall ´injury prevention´ program.

To keep the search feasible, an arbitrary limit was set to choose only those articles published between year 2000 and 2011.

For articles to be included into a first initial item pool, the articles´ topic or abstract had to contain the terms “fire*”, “residential”, ”safety”, ”emergency”, “preparedness”, ”education”, ”prevention”, ”intervention” or “evaluation”.

The first search on Scopus was done using the term “fire education” and yielded 1118 articles. Fifty articles were identified as having to do with fire. Eight could be downloaded directly via the database. The remaining 42 were not accessible. Via Google and GoogleScholar, additional 35 of these 42 remaining could be found using the title of the article in combination with the term “pdf”. In total, 43 articles were identified and included into the initial pool of items.

A second search on Scopus using “fire prevention” resulted in 3797 articles, where 1032 remained after inclusion of only written articles and exclusion of “engineering”, as engineering represents the more technical perspective and would therefore be beyond the scope of this work. Analyzing the topics, there were 52 appropriate articles left. 24 could be downloaded directly, additional 17 could be found on the general internet using the method described above. 41 were identified and included into the initial pool of items. In total, the search on Scopus yielded 84 relevant articles.

Using the database Web of Science and search term “fire education” resulted in 337 articles. Eighty-five of them were rated as appropriate; 49 could be downloaded either directly or with GoogleScholar and included into the item pool. The search term “fire prevention” yielded 892 results or 493 articles. 162 appropriate articles were to be included, 130 full-texts were downloadable. In total, 179 articles were included into the pool of items.

With PsycInfo, the author found 108 articles using the term “fire education”. 14 of them were rated as appropriate and 12 were finally downloadable. Using the term “fire safety” resulted in 57 hits, from which 37 were rated as appropriate and 18 finally downloaded. The term “fire prevention” resulted in 61 articles; 46 met the inclusion criteria and 33 were downloaded. In total, 63 articles were identified and included into the pool.

Using the database Eric, the term “fire education” yielded no results due to the restriction to year 2000 until 2010. “Fire safety” resulted in 20 articles with 6 of them appropriate and

downloaded. Finally, “fire prevention” gave 11 results, 6 articles were rated as appropriate and finally 4 downloadable. Thus, 10 articles were added into the initial pool.

To summarize, 3636 topics were analyzed and 336 scientific relevant articles were collected. The next step was to organize this item pool. Unfortunately, most files get renamed (e.g. “67343.pdf” instead of the header) automatically by the databases. Consequently, it was a challenge to organize this amount of articles. Therefore, an automatized citation application (Mendeley) was used which was able to rename the files according to its title. Another application (allDup) was able to find 92 duplicates among the files, as many articles were published in multiple databases and some even in different journals. A manual search found three additional duplicates.

In total, there remained 241 articles which finally constituted the initial pool of relevant articles. The next step was to put them in a table to further enhance overview. Before a process of categorization could be initiated, the author read all 241 abstracts to assess relevance for the literature review at hand. Scores were given to the individual texts, ranging from 0 stars if the article seemed irrelevant, to 3 stars if article seemed highly relevant or 4 stars if the article was a relevant review of the literature.

Analyzing every single abstract, the author categorized the articles into 7 categories that will be described briefly in the following. Note that these categories are not sufficiently distinctive; some are overlapping as articles can have multiple focuses. In those 27 cases, articles were classified into multiple categories. Furthermore, 26 articles were discarded because; (a) they had a non-relevant focus like chemistry, biology or surgery, (b) were not written in English, (c) were no empirical articles but books or anecdotes.

Interventions & Evaluations: Forty-seven articles were classified as presenting either an intervention aimed at reducing the risk of a deadly fire or an evaluation of an intervention. The interventions were not exclusively targeting residential fires; wildfire or scalds and burn prevention programs were frequently found.

Data & Risk Factors: Sixty-two articles had their focus on delivering empirical data on risk factors associated with death and injury from fire and burns. Frequently, hospital admission data was analyzed to give an epidemiology of the causes and correlates. Only five articles focused solely on data of smoke alarm ownership and maintenance.

Wildfire: Sixty-one articles focused on forests and wildfires. Most frequently, the articles proposed models of wildfire occurrence or proposed techniques to predict and map wildfire. Four articles presented a prevention intervention.

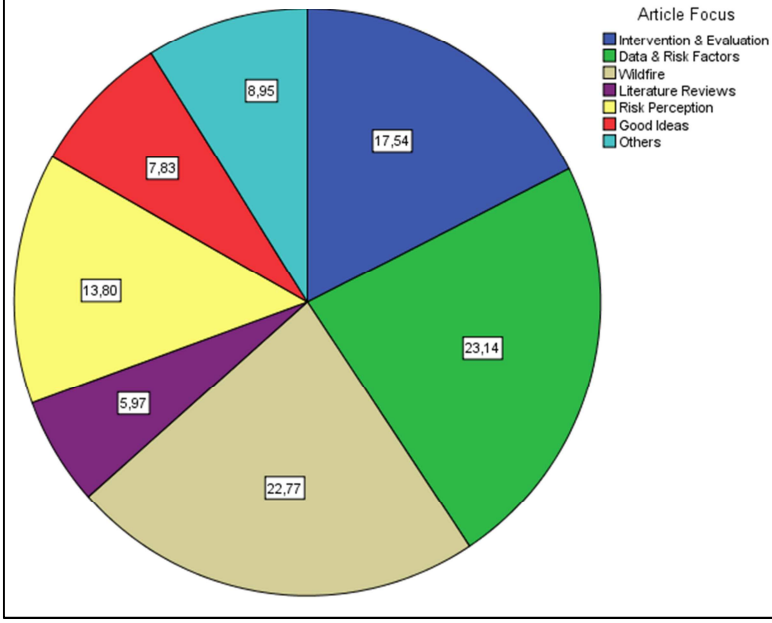
Literature Reviews: Sixteen articles were identified as a review of the literature covering topics as teaching safety skills to children, to the elderly and other target groups. Reviews of interventions on arson and wildfire, as well as on general risk factors were classified into this category.

Risk Perception: Thirty-seven articles were classified as giving a picture on human perception. Frequently, the authors of the articles elicited people´s view on prevention of fires and associated injuries. Articles focused not only on the risk perception of lay people; target groups were, among others, chief firefighters, stakeholders and municipalities.

Good Ideas: Twenty-one articles were classified as presenting a ´good´ or innovative idea. Examples include assessment tools to elicit human knowledge about fire or virtual reality observations of human behavior in cases of emergencies. Innovative articles presented, for example, possibilities to detect wildfires from space or using animals as fire detectors. Some articles described initiatives to change the design of cigarettes to lower the risk of accidental fire or approaches to change the sound design of smoke alarms to enhance hearing ability.

Others: 24 articles could not be readily categorized into the above mentioned categories. Mostly, articles described some form of human behavior, for example in evacuation emergencies or escape situations. Some articles focused on presenting the dangers of busses, storage tanks, smoke or acquiring hepatitis while working as a health practitioner in the community.

Picture 1



The distribution of the categories is visually summarized in Picture 1. A comprehensive collection and database of all articles can be found in the appendix.

For the final articles to be included in this literature review the following criteria were set up; the study had to contain both a description of the intervention, its program parts and a measured effectiveness or an evaluation. Some articles were only evaluations of interventions, where the intervention itself was not described in the article. In these cases, the author tried to find the article describing the intervention. Excluded were articles that seemed to contain an intervention, but had in fact not. In those cases, the author tried to get to know the original article and downloaded the article if possible. In some cases, the article´s header (for example: "an educational intervention for police and firefighters for elders at risk: limits of education alone as a strategy for behavior change") suggested a fire prevention intervention executed by firefighters, but was in fact an anti-abuse intervention. In some cases, articles described only a pilot-study or proof of a concept, without realizing a ´real´ execution of the intervention and without any empirical evidence of its effectiveness. In some cases, the articles were only retrospective cost-analyses of a given intervention and therefore not included to this review of theoretical fundaments of fire prevention programs.

3. Results

3.1. Explicitly used Behavior-Change Theories

"Kids and Fires Are No Match: Fire and Trauma Prevention for Teen Parents" by Greenberg (2001)

This fire prevention intervention emphasizes the humans´ psychological need of communicating or verbalizing problems and traumas in the aftermath of fire. It is based on a combination of well-known psychological theories of human behavior. In 1991, theorists held a workshop on behavior change and agreed on key-concepts of different theories. This combination of the Health Belief Model, Social Cognitive Theory, Theory of Reasoned Action, Theories of Self-Regulation and Self-Control and the Theory of Subjective Culture and Interpersonal Relations was the fundament of the intervention´s design and provided the key-concepts to measure its effectiveness.

Explicitly, it was stated that for a behavior to be performed, the following points are necessary and sufficient (Fishbein et al., 1991):

a) The person has a strong, positive intention to perform the behavior,

b) the person encounters no environmental constraints to perform the behavior,
c) the person possesses the necessary skill to perform the behavior.

While these three factors are said to be sufficient, the following points are said to be influencing the strength and direction of intentions;

d) The person believes that the advantages of performing the behavior outweigh the disadvantages,
e) the person feels social pressure to do the behavior,
f) the person perceives his self-image consistent with the behavior,
g) the person feels an emotionally positive attitude about the behavior, and
h) has a feeling, that he can do it.

With this framework in mind, the program components aimed at giving concrete suggestions on how to prevent fire in the home and decrease the risk of developing post-traumatic stress-disorder by following these topics:

a) Reporting the causes of fire,
b) listing of prevention methods and techniques,
c) thinking about actions to take in case of a fire in the home,
d) identifying personal feelings after a trauma,
e) discussing ways for teen parents to feel better by seeking material and emotional help,
f) identifying someone to talk to for support,
g) identifying barriers in seeking help,
h) identifying children´s feeling after a trauma,
i) identifying children´s behavior on a developmental basis after a fire trauma and identifying symptoms of traumatic stress,
j) identifying ways to help children deal with trauma.

Eighty-one parents (average age: 31) and 124 teen parents (average age: 19), most of them with no home fire experience, followed an 45 minutes lasting presentation and discussion, which was led by a social worker and the author, Helene Greenberg. According to her, this interventions´ “intention (…) was to teach young parents how to protect their homes, themselves and their children by taking time to talk, especially when traumatic situations occur”(Greenberg, 2001, p. 8).

Participants first filled in a pre-intervention questionnaire asking about home fire experience, perception of vulnerability for home fires, knowledge of fire safety, ability to find someone to talk with, identification of barriers to talking to someone, knowledge of

developmental child trauma behavior and knowledge of how to help the child cope with trauma.

The post-intervention questionnaire measured the same constructs after the intervention. The difference was in wording; the pre-test asked “have you ever…?”, whereas the post-test asked “have you the intent to…?” follow the recommended response.

Meanwhile, participants had the presentation and the discussion about the topics mentioned above. This provided participants the possibility to share their own fire experiences. At the end, participants were given a free smoke detector.

Results show significant higher scores on the post-test compared to the pretest for both parent-groups, indicating that this fire prevention intervention had an overall positive effect. However, the author acknowledges that her intervention´s results might be subject to the ´testing-effect´; participants might have answered in a biased manner, because they knew they were tested.

“What picture is worth a thousand words? A comparative evaluation of a burn prevention programme by type of medium in Israel” by Shani (2003)

The next intervention at hand uses many theoretical constructs, either as a suggestion for the design of the intervention or partly as measurements of intervention effect and outcome;

(1) According to McGuire´s ´model of information processing´ (1973), the likelihood of behavioral change is determined by communication factors (source, channel, message, receiver and destination) on the response variables (attention, comprehension, yielding, retention, behavior).

(2) According to more recent fear-appeal theories, all humans have an inherent motivation for self-protection. Therefore, no protective actions can be expected if a specific health-threat is perceived as irrelevant or low. Too much fear is counterproductive, unless

(3) the ´self-efficacy´, as defined by Bandura in the ´social learning theory´ (1977), is strong so that people have confidence in their ability to carry out a recommended response to control the danger.

(4) ´Internal versus external locus of control´, as defined by Wallston (1992), refers to the perception of a strong sense of personal control over things in life (internal) versus the belief that things are in the hands of fate and luck (external).

(5) ´Sense of coherence´, as defined by Antonovsky (1987), is a personality disposition to life in which the world is seen as more or less comprehensible, manageable and meaningful.

From three schools, 179 kids aged 12 to 13, were divided into three conditions; a ´slide group´, a ´video group´ and a ´slide plus video group´. The first two groups were exposed to a 45 minutes session, whereas the third group were exposed to a 90 minutes session. The sessions focused on presenting a dramatized risk situation for children (for example, fire, hot objects or chemicals), followed by a picture showing the unfortunate consequence (e.g., a burn injury).

With a pre-test and a post-test two months later, results were measured by the following constructs;

(1) ´program effect´ with four items measuring improvements in burn-related knowledge, understanding and safety behavior.
(2) ´fear response´, measured by five mood adjectives, such as afraid or anxious.
(3) ´threat´ was conceptualized by four items measuring ´perceived severity´, seven items measuring ´perceived vulnerability´ and seven items measuring ´perceived likelihood´.
(4) ´internal locus of control´ was measured by two items, and ´external locus of control´ was measured by one item.
(5) ´self-efficacy´ was measured by five items asking the participants´ belief of being capable of following the recommended instructions regarding the prevention of burns.
(6) ´sense of coherence´ was measured by 13 items.

According to the author, the most important predictor of program effect was ´self-efficacy´, explaining 28% of the variance. There was also a significant interaction effect with ´fear´, meaning that participants who reported higher levels of fear after the intervention, were more likely to improve their knowledge and preventive behavior only when they also had a stronger belief in their self-efficacy. This finding is consistent with a recent meta-analysis on fear-appeal techniques; the stronger the fear-reaction, the higher the likelihood of a desired change and that fear only motivates pro-active protective behavior only in combination with high efficacy-beliefs. Also consistent with the fear-appeal literature and the social learning theory were findings that the third condition (slides plus video group) produced the poorest results

with regard to desired changes in health beliefs, because the longer sessions produced more fear while not enhancing skills to prevent the danger, as recommended by Bandura (1986).

"Design and Implementation of Injury Prevention Curricula for Elementary Schools: Lessons Learned" by Azeredo & Stephens-Stidham (2003)

The next intervention is a state-wide safety campaign involving schools and children. According to the author, much research from injury prevention, behavior change theories and educational psychology has been used in writing this program;

(a) to "increase understanding, knowledge retention and sustained behavior change messages must be repeated and spaced using interrelated themes and varied modes of delivery" (Azeredo, p.1).

(b) to "inspire learning and creativity, the strategies included mathematical and science problems, creative writing, roleplaying, stories, visual enforcement and hands-on examples" (Azeredo, p.1).

(c) to learn new safety habits and values, modeling (or observed learning) is effective because of children´s desire to emulate positive behaviors.

Thus, we explicitly have the concept of ´observed learning´ from Social Cognitive Theory and also general learning-theories from psychology. Implicitly, this intervention also covers efficacy-beliefs by giving prevention suggestions. Furthermore, it arguably covers ´response costs´ by giving away free smoke alarms and bicycle helmets.

The program components included:

(1) 18 and 27 lesson plans for kindergarten up to grade 5, where safety messages were both overt and subtle, imbedded in exercise and activities. For example, in the ´brain and spinal cord injury´ lesson, learning involved "anatomical descriptions related to risk factors, sentence completion tasks about the brain, spine, and safety habits, doing arithmetic problems involving safe water depth, and calculating students´ use of seatbelts" (Azeredo, p.2).

(2) A free smoke alarm give-away project by fire departments, where families had the opportunity to have a smoke alarm installed by fire fighters. In total, 250 smoke alarms were provided. Additionally, fire departments had an agreement with local newspapers, that if a fire broke out in a home and the family had been able to escape in time thanks to the smoke alarm given, the newspapers would credit the program.

(3) Bicycle helmets were given away on special bicycle fairs at school. The helmets were individually fitted to the children, whose parents completed an application-form, which in turn was accompanied by a ´safety talk´ with a fire fighter. In total, 1300 helmets were distributed.
(4) Pen pal friendships were established between schools, and children wrote each other about injury prevention and safety habits.
(5) Letters to parents.
(6) Injury prevention talks at parent-teacher meetings.

Results showed significant differences in children´s behavior, attitude and knowledge before and after the campaign; belt use increased from 21% to 36% in schools following the program compared to a 1% decrease in the control schools. Helmet use increased from 0 to 10%.
According to the author, data is reliable because an extensive evaluation plan has been made prior to the campaign;

(a) A formative evaluation is generally described as the "testing of program components for feasibility, appropriateness, acceptability and applicability to the program and the target population" (Thompson, 1998). This has been established asking the teachers about their "receptiveness of teacher training, negotiation in establishing protocols, and the quality of teachers´ suggestions for incorporating the curriculum within their lesson plans" (Azeredo, 2003).
(b) Process evaluation is the "testing whether a program is reaching the target population as planned" (Thompson, 1998). To establish it, feedback, observations, expectations and methods of implementation were discussed at weekly meetings with teachers and staff.
(c) Impact evaluation measures the changes in participants' knowledge, attitude, beliefs and behaviors. Mostly established by the children themselves, safety belt and helmet use were observed and compared before and after the intervention. Additionally, a comparison between self-reported use and observed use has been made and written evaluations by teachers and school principals have been analyzed. As an indicator of program effectiveness, the number of given-away smoke alarms and helmets were used.

“A randomized, clinical Trial of a Home Safety Intervention based in an Emergency Department Setting” by Posner, Hawkins, Garcia-Espana & Durbin (2004)

The following intervention does not explicitly use a specific theory as fundament, but according to the author, its success is attributable to concepts from the Health Belief Model. The intervention itself has its focus on giving away a free safety-kit to caregivers, whose child has just been taken to the emergency department due to an injury at home, thereby counting on the ´cue-to-action´ construct and ´vulnerability´. Furthermore, the safety-kit covers ´response costs´ and ´response efficacy´ by giving a verbal review of a prevention-brochure to caregivers.

Ninety-six caregivers with injured children under five years were divided into two groups; an experimental and a control condition. Before getting assigned to one group, participants had a face to face interview with scripted multiple-choice questions about safety practices at home. Their responses were transformed into quantitative scores for analysis.

In the control condition, participants were given the usual emergency department discharge instructions related to the specific injury of the child. A 2-page-brochure was handed to the caregivers, which contained general information about the prevention of common household injures, divided into seven sections; fire safety, burn hazards, choking hazards, drowning hazards, fall prevention, poisoning prevention and laceration prevention.

In the experimental condition, participants received educational counseling in terms of a scripted verbal review of the entire brochure. Additionally, participants were provided with a home safety kit containing nine items; cabinet latches, drawer latches, electrical outlet covers, tub spout covers, nonslip bath decals, bath water thermometer, small parts tester (choking tube), poison control telephone number stickers and literature related to fire and window safety.

All participants were contacted few weeks after the intervention for a repetition of the questionnaire. Results indicate higher average safety scores for the experimental condition in poisoning, cutting and burn safety, but not in fall, water, aspiration and fire. The authors suggest that this improvement in safety behavior was mostly attributable to the increased use of the distributed safety devices because 57% of the variance in a summed overall safety score was explained by the change in device use score alone. The authors attribute the success of this intervention to the fact that caregivers might be more receptive to prevention education just after their child sustained an injury. This provides a so-

called ´teachable moment´, which describes the phenomenon whereby learning is possible only when the time is right. They further state that psychological behavior theories support the advantage of the teachable moment; the Health Belief Model states that an individuals´ motivation to adopt preventive health behaviors is influenced by perceptions of personal vulnerability and disease seriousness and commonly requires a triggering event. According to the authors, this triggering event might be the emergency department visit after an acute injury, which represents "the event necessary to nullify the misperception of invulnerability and to catalyze behavior change" (Posner, p. 1607).
By giving this comment, we identify the theoretical construct of ´vulnerability´ as implicitly covered here, which represents another factor that made this study arguably effective.

3.2. Implicitly used Theoretical Concepts

"Case Study: Using a Virtual Reality Computer Game to Teach Fire Safety Skills to Children diagnosed with Fetal Alcohol Syndrome" by Padgett, Strickland, & Coles (2006)

The following intervention does not explicitly refer to theories of behavior change, but implicitly uses two key-concept of Social Cognitive Theory. By teaching ´skills´ to escape, the intervention probably enhances efficacy beliefs such as ´self-efficacy´ by strengthening participants' perceived ability to escape. Furthermore, the learned skills arguably provide enhancement of ´response efficacy´ by showing that an escape is an appropriate response upon seeing a fire.

The intervention itself presents a ´virtual reality-game` intervention for mentally disadvantaged children diagnosed with the `Fetal Alcohol Syndrome´ [FAS].
Scientific background assumes that those children are practically ´unteachable´ by standard methods (Sanders, 2001). Research in Virtual Reality pointed out that games can be effective in teaching safety skills to individuals with mental and physical handicaps (Foreman, Wilson & Stanton, 1997).

Psychologists know that "learning is enhanced, when the information (…) is presented in multiple modalities allowing individuals to access different areas of memory when recalling the information (Padgett, p. 66). Although no explicit theories of behavior change were

utilized, we see that general learning theories from psychology were used in the design of the intervention.

A virtual reality environment was established that could be played relatively independently by the child, that is without direct assistance from a teacher or parent but with instructions only given by the computer itself; auditory and spoken by an animated character explaining and demonstrating what to do.

The game allows multiple sensory inputs to be presented in a way that is interesting for children. Knowing that kids generally enjoy playing games, it allowed the "illusion of presence in a computer-generated environment, combined with explicit real world generalization techniques, reinforcing safety skills by using visual and verbal cues, spatial skills, and physical action in the learning process" (Padgett, p. 66).

The game itself is based on the U.S. Fire Administrations´ guidelines for young children and involves three crucial steps; at first, the fire danger must be recognized, then the home must be left by the shortest safe route and in the third place, the child should wait at a pre-assigned meeting place outside the home.

Five children with differing severity of the FAS participated in this intervention; their task can be generally described as learning safety skills and generalizing those skills in a real world simulation. At first, the kids individually underwent a simple pretest, where they were asked to arrange three pictures into the correct sequence. Prior to the intervention, no child was able to do this correctly.

After this pretest, the children had the virtual reality training session with two conditions; no fire present or fire at several spots. Recall that three explicitly stated behavioral skills were to be performed; recognizing the fire, escaping the house and meeting at a place outside the house. In each condition, the game showed three different levels of support; in the beginning first level, the animated character was leading and yellow arrows indicated the correct path. In the second level, the yellow arrows were not present, only the animated guide. In the third level, neither the animated character nor the yellow arrows were indicating the correct behavioral response.

The animated character responded to the child´s motion; it gave positive reinforcement to correct behavior by jumping and saying "good job". If the child behaved dangerously, such as walking into a fire, the screen went black and the danger was explained.

A week later, the child was again tested on the picture arrangement task. Results show that after the intervention, children were able to identify fire safety components 100% of the time.

4 out of 5 children correctly performed the 3 safety steps with 100% accuracy in the picture arrangement task and also in an imaginary real world scenario.

“Games that Work: Using Computer Games to Teach Alcohol-Affected Children about Fire and Street Safety” by Coles, Strickland, Padgett, & Bellmoff (2007)

The following article is very comparable to the aforementioned study. Written by the same authors, it is another virtual reality intervention developed for children diagnosed with the Fetal Alcohol Syndrome and aimed at learning two specific skills; appropriate escaping behavior and crossing a street safely. Although not referring explicitly to theories of behavior change, we once again see the concept of ´skills´ covered. Again, these skills are taught by ´modeling´ and ´reinforcement´ and probably provide enhancements of ´efficacy-beliefs´.

Thirty-two kids, aged 4-10, were randomly divided into two groups which were then exposed to either the fire safety or the street safety game. To allow measurement of learning, the pre-test and the post-test tested the two groups on both games; the fire safety group functioned as the control group for the street safety group and vice versa.

Before children started to play the game, they had to learn how to navigate with the arrow-keys on the keyboard, which was realized by introducing a treasure hunt game to all participating children.

After mastery, the participants in the fire safety group were digitally placed into a house with six rooms, while the children in the street safety group were placed on a standard sidewalk. For both groups, an animated dog modeled the correct behavior in small steps. While the participants then moved through the virtual environment, correct behavior was reinforced by jumping and saying “good job”, or extinguished, if the child attempted a dangerous behavior like walking directly into the fire or crossing the street without looking. In that case, the screen went black and the danger was explained. Additionally, the participants´ motion was restricted during more complex skills (such as looking left before right at the crosswalk), in order to not learn an incorrect sequence.

The results were promising, according to the author. The participants could not only verbally describe the safety procedures when tested, they were also able to generalize their skills to a

more real world scenario in which they had to pretend that a fire broke out and were asked to show their newly learned safety steps.

"Decreased Juvenile Arson and Firesetting Recidivism after Implementation of a Multidisciplinary Prevention Program" by Franklin, Pucci & Arbabi (2002)

This intervention implicitly covers many key-concepts of behavior change theories. According to the author, this program´s focus lies on the "medical, financial, legal and societal impact of fire setting behavior, with emphasis on individual accountability and responsibility" (Franklin, p. 2). By this, the concept of ´severity´ and ´vulnerability´ are covered implicitly. The same concepts are probably covered by talking to a fire victim. Furthermore, it implicitly covers the ´response costs´ concept by giving away a free fire extinguisher. ´Efficacy beliefs´ are probably enhanced by means of instructional material.

Focusing on juvenile fire setters, the intervention describes a multidisciplinary approach involving the court system, fire departments, schools, parents, a Trauma Burn Center and fire victims. Scientific background states that only providing information on the need of having a smoke alarm is not sufficient to increase safety, smoke alarms should be given away to order to increase rates of compliance and to increase safety (Liao, 2000).

The participants, 234 parents together with their fire setting child, defined as having had at least one incidence of fire setting, were divided into two groups. The control group received no counseling or only a very brief counseling by a fire fighter on one single occasion, whereas the experimental group followed a one-day program at the Michigan Trauma Burn Center.

Among many program components, the participants first received "didactic and interactive instruction from nurse educators, trauma surgeons, social workers and fire fighters" (Franklin, p. 2). Furthermore, participants get counseled by peers that have already completed the same program in the past. According to research, this technique "has been well described with the treatment of alcoholism and seems to help the juveniles in our program to not feel isolated" (Franklin, p. 5). In the burn center, participants observed and spoke with a real fire victim. At the end, the family was provided with a smoke alarm, a safety light, a fire extinguisher, safety video and further instructional material.

Results were measured by means of the recidivism-rate of the participating children; for the experimental group, only one child out of 132 returned to fire setting behavior. In the control

group, the recidivism-rate was 37 out of 102. According to the author, this intervention´s success is attributable to four key elements: "partnership with burn center for interactive prevention education, parental participation, providing safety equipment for the home, and peer counseling with (…) graduates and juvenile burn victims" (Franklin, p. 5).

"Burn Education Awareness Recognition and Support (BEARS): A Community-Based Juvenile Firesetters Assessment and Treatment Program" by Bennett, Gamelli, Duchene, Atkocaitis & Plunkett (2004)

The following intervention does not use any theories of behavior change explicitly, neither as a suggestion for intervention design nor as evaluation components. However, focusing on young fire setters, the intervention puts once again emphasis on an interdisciplinary approach (legal system, police, fire department and the family itself) and on finding out the actual motives or determinants of a child´s fire setting behavior. Nevertheless, by telling about the consequences of fire setting, the ´severity´ concept is probably covered.

The authors and designers of this prevention campaign realized that some children just set fire out of curiosity and still others set fire in order to satisfy emotional needs. Depending on the category, different solutions were provided.

In the article at hand, 42 kids participated. Mostly, this participation was not really a free choice, but was imposed by law enforcement as an alternative to jail or sentencing. The kids were assessed by a fire fighter to find out to which category the child in question belongs to. The assessment-tool used is divided into three parts, which all take place in a fire department; an interview with the child itself, another interview with his family and a ´child behavioral worksheet´ to assess the fire incidence and possible family dysfunctions.

The scores on these different parts were summed to determine a risk for future ongoing fire set behavior. Low scores correspond to fire setting out of curiosity and simply because children "do not understand the potentially devastating consequences of playing with fire" (Bennett, p. 325). For these children, fire education about the risks was provided, whereas those scoring high, indicating fire setting due to emotional needs, were referred to further mental health evaluation.

According to the author, results indicate that none of the children returned to fire setting behavior following this intervention.

“Evaluating injury prevention programs: the Oklahoma City smoke alarm project” by Mallonee (2000)

The intervention presented in this article does not explicitly refer to theories of behavior change. However, implicitly it probably covers the concept of vulnerability and severity by presenting the major causes of residential fires. Furthermore, it implicitly covers the ´skills´ concept by teaching instructions related to installation and maintenance of smoke alarms. Thereby, it implicitly covers ´efficacy-beliefs´ and ´response-costs´ by giving away the smoke alarms and batteries yearly.

The intervention itself was a community-based campaign running six years in a high-risk area. Besides, it investigated the question how smoke alarms should be distributed; either installed by fire fighters or freely obtainable at a fire department. Additionally, a comparison of different methods of distributing flyers was made.

This intervention had three main components:

(1) Distribution and testing smoke alarms in houses. More than 10000 smoke alarms were distributed in two different ways:
    (a) ´canvassing´ means that a fire truck with sirens on would drive down a particular street and announce that volunteers were giving away free smoke alarms.
    (b) ´letting obtain´ means that the population would need to go to the next fire department to get a smoke alarm for free.
(2) Written education material to selected populations and individuals, which addressed the major causes of residential fires and also covered 911 emergency calls, escaping instructions as well as instructions concerning installation and maintenance of smoke alarms.
(3) Flyers to not only increase awareness about the intervention, but also to inform about risk factors and listing dates, times and locations where smoke alarms were to be

obtained for free. Additionally, the flyers mentioned that professional installation of smoke alarms could be requested. The flyers were distributed in three different ways:

(a) Mailed to all residents
(b) Distributed only at public places
(c) Placed by volunteers in residential postboxes

In the 2nd year, batteries were provided to participants. In the 3rd year, only a postcard was mailed to participating households reminding to change the battery.

Results indicate that canvassing was more effective in terms of reaching the population; 5.9 smoke alarms were provided per hour compared to only 3.1 with the other method. However, "most alarms were installed even though they were just handed to the participants" (Mallonee, p. 172).

Three months after the implementation of the intervention, two-thirds of the alarms were installed and also functioning. Two years later, 50% were still intact. In the population that underwent the intervention, injury rates decreased by 81% compared to only 7% in the comparison-population. As a real outcome measure, the author estimated that "at least 60 injuries and deaths were prevented" (Mallonee, p.170). According to the author, this success cannot be explained on the free distribution of smoke alarms alone, but also on the increased awareness and publicity.

"Fire Safety Skills Training for Individuals with Severe and Profound Mental Retardation" by Knudson, Miltenberger, Bosch, Gross, Brower-Breitwieser, & Tarasenko (2009)

Although not explicitly referring to the Social Cognitive Theory, this intervention taught behavioral escaping skills after hearing a smoke alarm to mentally retarded participants. This was done by modeling the correct behavior and reinforcing it. In the literature, it is noted that studies teaching safety skills lack naturalistic assessment; therefore, this intervention took place in the bedroom or living room of seven mentally retarded participants.

The training sessions began with short instructions on what to do in case of hearing the smoke alarm, whereupon the experimenter activated the smoke alarm while saying "(name of participant), FIRE, GET OUT! ". Each following trial, the experimenter would use a less

intrusive instruction; at first trials, the experimenter modeled the correct behavior. The prompt orders were complete physical guidance (taking the participant by the hand), simple physical guidance (slight tug on arm), gestural (pointing to an exit) or verbal (saying “let´s get out”).
If the participant in question exited the house, he or she was praised through reinforcement in terms of highly preferred food.

During naturalistic assessment, the experimenter hid himself and activated the smoke alarm while observing and measuring the latency and duration of exiting behavior.

In general, the results showed the training to be ineffective. Only one of the seven participants learned to exit the house quickly and without further prompts or instructions.

The only other positive effect seemed to be that less and less prompting from staff was required. According to the author, one possible explanation why this intervention did not successfully increase escaping skills was the level and severity of mental retardation, which was not controlled in this study.

“Home Delivery of an Injury Prevention Kit for Children in four French Cities: a Controlled Randomized Trial” by Sznajder, Leduc, Janvrin, Bonnin, Aegerter, Baudier, & Chevallie (2003)

The next article at hand describes an in-home intervention focusing on families with new-born children. Although not explicitly referring to a theory, concepts from behavior change theories are covered by giving out a free safety kit, thereby covering ´response costs´. Arguably, ´efficacy-beliefs´ probably could have been enhanced by describing the advantages and usefulness of the safety kit in preventing injuries. If this really happened is unclear, because the article is not sufficiently elaborating on this information.

One hundred families were divided into two groups; each received counseling by a nurse or a doctor and a brochure about injuries at home and methods of prevention. Only the experimental group additionally received a safety kit, which included the following items: cupboard and drawer latches, door handle covers, table protection corners, electric outlet covers, a non-skid bathtub mat, a smoke detector, a phone sticker with the number of the poisoning control center, a screw hook, an inflated tap cover, a refrigerator closing strip and an universal door latch for electrical appliances.

The families in each group were visited twice during the intervention; for the first time after the child reached six to nine months, to collect information on social status, physical environment at home and safety behaviors. Eight weeks after the first visit, safety improvement was measured by a closed response (yes´ or ´no´ responses) questionnaire. Items on this scale asked for instance, whether the participant locked medicines in a safe place. Analyzed were safety improvements for risks preventable by devices in the safety kit, improvements for risks not related to the kid and improvements related to each specific type of home injury.

Results revealed that those who received the safety kit demonstrated higher safety improvements in risks related to falls, fire and burns, poisoning and suffocation. Additionally, safety improvements were seen in categories unrelated to the kit and in categories that were not discussed at all, indicating a multiplying effect.

However, the author concludes "that free safety devices are probably crucial for implementation of home safety changes" (Sznajder et al, p. 264).

"In Search of Effective Education in Burn and Fire Prevention" by Mondozzi & Harper (2001)

The following preventive intervention relied on no explicit behavior-change theories while focusing on children at 164 elementary schools. Nevertheless, the concept of ´efficacy beliefs´ (both ´self-efficacy´ and ´response-efficacy´) is probably covered by playing a game teaching prevention methods.

Two games were distributed which covered burn and fire prevention topics, "such as sunburns, fire escape plans, smoke detectors, lighters and matches, hot objects, treatment of minor burns, and many more" (Mondozzi & Harper, p.279). The fire fighters game required the class to divide into two groups, and each group possessed a house which was ´on fire´; several flame-symbols were attached to it and the only possibility to remove them is to answer the multiple-choice questions correctly. Finally, the first team to remove all flames from their groups´ house won.

Results were evaluated by means of a ten-question multiple choice test prior to the game, and a post-test, timed approximately one week after game play, to measure retention of knowledge. The mean test score per class was examined on pre- and post-test, indicating a significant improvement as a result of this intervention. In answering all 10 questions correctly, improvements were between 8 and 40% for children from 2nd grade, and between 7 to 51% for 4th grade children.

“Prevention of Burns: 13 Years’ Experience in Northeastern India” by Sarma (2011)

The next article is not explicitly designed on behavior-change theories and describes a 13-years enduring intervention, initially designed to cover 15000 employees of an Indian oil company, 1240 students of six high schools and a general population of two million residents. Nevertheless, the concept of ´self-efficacy´ and ´response efficacy´ is probably implicitly covered by teaching skills and methods of prevention, and ´severity´ and ´vulnerability´ by telling the causes of fire.

In the beginning years, program components were as follows:

(1) Seminars and discussions on four clearly defined topics, such as causation of burns, preventive measures to be adopted, what not to do and the importance of early reporting to hospital.
(2) Schools were involved and held one program per year, with the same topics as listed above. Additionally, a quiz game was initiated by dividing the class into three groups and testing each on ten questions.
(3) Publications and banners in newspapers and public spaces.
(4) Shop floor visits and practical demonstrations for workers on the use of water for extinguishing a fire and as a first aid.

In the following years, these components were added:

(1) Books on burns, written in the local language.
(2) Meeting with local press yearly.
(3) Three talks on television and radio per year.
(4) A special burn prevention program, timed three weeks before the national fire cracker festival, to educate people on how to handle crackers safely. This program itself

contained additional components, such as more school education programs, three additional community-sessions and greeting cards containing do´s and don'ts for celebrating the fire cracker festival. Furthermore, eight more schools were included.

All participating students were tested on ten questions twice; the first time immediately after each program and a second time approximately six months later. They were also given five tasks to implement at home, such as recommending the own family to not cook on the floor, but only on a platform. Also, participants got books to help remembering the learned information.

Results were analyzed by means of real outcome measures; the records of patients delivered to the burn unit. Summarizing the improvements, it was found that there has been

(a) A significant decrease in incidences around the fire cracker festival,
(b) a significant lowering of burn injured patients to the burn unit,
(c) a significant decrease in severity of burns among students, better recall of preventive measures and greater general awareness,
(d) a significant reduction of average admissions to the burn unit per year,
(e) a significant faster average reporting time to hospital(from 15h to 8h) ,and,
(f) a significant reduction of inappropriate methods; in the beginning 80% of the population used toothpaste, boiled potatoes or cow dung as first aid, this number went down to 34% following the intervention.

"Sustainability of an In-Home Fire Prevention Intervention" by Duchossois, Nance, Garcia-Espana, & Flores (2009)

The next article has again no explicit reference to behavior-change theories. Nonetheless, we implicitly see some theoretical constructs; a free smoke alarm and a 10-year battery cover ´response costs´ and instructions probably enhance ´efficacy-beliefs´. The same goal is probably targeted by writing down an escape-plan, by showing that a planned escape route is crucial and effective for survival (´response efficacy´) and also easy to accomplish (´self-efficacy´) by the participants.

The article describes an intervention in a clearly defined high-risk-area, with poverty level more than double the rate of the U.S. Prior to the intervention, researchers established a community focus group of parents and their findings and opinions were the base of this

intervention. According to the parents, school was the place where fire education should be delivered. Also, the researchers came to know that nearly no one had an escape plan. Furthermore, because of parents´ problems and concerns about normal smoke alarms, it was decided to use 10-year lithium-run smoke alarms, which should be installed by professionals.

The intervention assigned participants into either a control or an experimental group. Each group received fire prevention education at school, but only the experimental group had an in-home visit by two fire fighters. In this way, two main education components were delivered;

(1) On each level of the house, a free smoke alarm with a 10-year battery was installed by one fire fighter, while the other fire fighter educated the participants on how to test the alarms.
(2) An escape plan was designed and written down on an erase board, which was given for free. The escape plan had to include two exits and one meeting place outside the home. Besides, it was stressed to never go back to a burning house.

Results were measured by one survey prior to the intervention and another one four months later, asking knowledge and behavior questions and observation of already existing smoke alarms. Self-reported data was available for 66 households and the findings can be summarized as follows:

(a) Prior to the intervention, 79% of the households had a smoke alarm, but only 45% were operational. After the intervention, the number of homes having an operational smoke alarm on every level of the house went up to 97%.
(b) Prior to the intervention, a written fire escape plan was found in 61% and a designated meeting place outside the home was only existent in 45% of households. After the intervention, there was a significant increase in both numbers; 69% had a written fire escape plan and 91% of households reported having a meeting place outside the home in the case of a fire.

“Virtual Reality for Life Skills Education: Program Evaluation” by Vogel, Bowers, & Meehan (2004)

The next article to follow is a virtual reality intervention for deaf children at school. Scientific research, but no explicit theories of behavior-change, provided the ideas and suggestions how

the intervention game should be designed. Explicitly, it was stated that the programs´ information must be visually presented in both linguistic and nonlinguistic forms, to hold attention longer and to create more motivation for reading and writing (Volterra, 1995). Furthermore, a multi-sensory approach (audition, vision and touch) is needed to best communicate with deaf children (Power, 1995). Once again, skills were taught to enhance efficacy-beliefs.

The intervention involved 50 deaf children, aged five to ten years, who had at least once a week the opportunity to enter the virtual reality classroom. At first, the teacher discussed the procedure and importance of specific skills, such as crossing the street safely. Thereafter, the children had the opportunity to train these skills in the virtual environment one-by-one, while the other children could watch the participant´s movement on a big screen in the classroom. Because deaf children must keep their teacher within their visual sphere at all times in order to follow instructions, a sign language window was added to the screen so that children would not have to turn their heads to receive instructions. During the game, the child in question sat on a special chair, which could mimic smells and sounds in order to address the need of a multi-sensory approach. To further increase perception of a real environment, participants wore a head-mounted display to allow the screen to move constant with the child's head.
The virtual reality game itself consisted of six scenarios or skills, which were switched each week;

(1) The ´find the music room´ scenario was used to introduce the participants to the joystick navigation. In the virtual environment representing a school, they had to find the correct room.
(2) The ´fire drill´ scenario, where participants had to escape the school on shortest and fastest way.
(3) The ´stranger/danger´ scenario, where participants saw a stranger and were required to run back to their teacher.
(4) The ´gun safety´ scenario, where participants encountered another virtual child carrying a gun. The task was to decide what to do next: either calling the police or finding an adult.
(5) The ´home safety´ scenario resembled the gun safety scenario, except that instead of a gun, another virtual person got injured.
(6) The ´crossing the street´ scenario. There, participants were required to cross a street safely by doing the appropriate safety step (looking both ways before crossing).

Results were obtained by observing the behavior of the participants in the virtual reality environment to measure acquisition and transfer of knowledge. As a quantitative measurement, the completion time for each skill or scenario was noted. After successfully completing the tasks, participants were asked to verbalize their intentions and plans while having played the game. Furthermore, observers judged the behavioral change in the participants with the aid of a checklist.

Additionally, parents and teachers were asked how well the children generalized their learned skills outside the classroom; one-third of parents said the intervention enhanced their child´s learning and 9 of 10 parents said that the intervention increased their kid´s motivation and interest in school. However, the author acknowledges several limitations of this version of a virtual reality game; for older children, the tasks were too easy so that they ´played´ with the system instead of trying to solve the tasks. As an example, computer generated completion rates for the ´crossing the street´ scenario indicated 92.2%, but only 55.6% of participants really looked both ways before crossing.

4. Conclusion and Discussion

Looking at the specifically applied theories in prevention programs, we see that theoretical concepts of behavior-change are rather rare; only two out of 15 interventions explicitly referred to theories of behavior-change by using them as the architecture of the intervention and also as concepts to measure its effectiveness.

Article #1 combined several prevailed theories into a universal behavior change model, covering roughly all relevant concepts and variables such as intention, barriers, skills, social norm, self-image, attitude and self-efficacy. To change behavior, these concepts were applied both as the architecture of the intervention and as concepts to measure the interventions´ effectiveness. By presenting the causes of fire, discussing prevention methods, thinking about escaping from fire, anticipating parents´ emotions by telling each other about fire experiences and anticipating children’s emotions, parents had the opportunity to find the recommended response (i.e. seek help and help your child deal with traumas) on their own, instead of only hearing it by anybody and probably not elaborating on the recommended response.

Article #2 applied fear-appeal techniques by presenting slides and/or videos illustrating a risk-situation and the drama-laden consequence. It was found to be effective and results were along the assumptions of the Extended Parallel Processing Model; participants with higher fear were more likely to report preventive behavior, but only those participants who also reported higher corresponding efficacy-beliefs. The study also explicitly used McGuire's Model of Information Processing, Locus of Control and Sense of Coherence, but probably only as components of measuring the intervention´s effectiveness. Whether these concepts were also used in the design of the prevention material is unclear, since the only information available from the article is that participants were exposed to slides/videos showing a situation and the consequence. What becomes clear here is the fact that the scientific articles written by the authors are sometimes insufficiently informative; we will never know how communication messages and persuasion methods were really presented, unless they are carefully described. However, these two studies represent very good examples of how to change behavior; intervention design is crucial. The same is true for conceptualizing and measuring results.

From those studies referring explicitly to concepts related to behavior-change, one other study used modeling explicitly (by referring scientifically correctly) as the method of teaching appropriate safety behavior (article #3). Furthermore, knowledge from educational psychology provided suggestions for overall intervention-design. Yet, implicitly used theoretical constructs were identified; decreasing response costs by giving away free smoke alarms and helmets and increasing efficacy-beliefs by talking about safety and prevention methods.

The other study referred to the Health Belief Model and its concept of ´cue-to-action´ as the crucial success factor (article #4). Additionally, the concept of ´vulnerability´ is also implicitly covered and seen as a crucial success factor as the author stated that the participants' child -which was just delivered to an emergency department- provided the cue-to-action to "(…) nullify misperceptions of invulnerability (…)" (Posner, p. 1607). However, it remains unclear whether the author did know this in advance and subsequently designed the intervention according to these concepts, or only came to know it post-intervention by brooding about what made this intervention work.

In the following, the concepts that were applied most often will be presented.

Severity: This concept was mostly covered by telling the consequences and impact of fire setting (article #7 and #8). One study did not just only tell the consequences, it showed them

and let the participant feel and see how severe fire injuries can be by means of communication with real and disfigured fire victims (article #7). Interestingly, these methods were solely utilized in interventions focusing on juvenile fire setters.

Vulnerability: The best example of this concept comes from one intervention, where participants painfully realized that they and their kids were not invulnerable to injuries (article #2). Placed in an emergency department setting, vulnerability has been demonstrated to be the key-experience that led parents change their behavior concerning safety-issues. Besides, this construct was most often implicitly covered by telling the causes of fire.

Response costs: This concept has been shown to be universally utilized in nearly all interventions. Most often, the participants´ costs of responding to a threat have been lowered by giving safety devices for free; helmets (article #3), smoke alarms (article #3, #9 and #14), batteries (article #9 and #14), safety kits with several devices (article #4 and #11) and a fire extinguisher (article #7).

Efficacy-beliefs: Response-efficacy is another often-used concept. Practically, it has been covered by prevention talks that accompanied the giving-away of safety devices, as seen in the previously mentioned concept. Participants in interventions got, for example, a verbal review of a prevention-brochure (article #4) or instructional material concerning the correct use of fire extinguishers (article #7). While this communication does not necessarily make people believe that the recommended response is really effective in eliminating the threat, it at least tries to by persuading people that there *is* a response to the fire threat. Because just giving-away devices does not guarantee that people will know how to use them and know that they ´work´, instructional talks were often subsequently held in many intervention. This indicates that response costs and response efficacy are practically intertwined, and its success lies on simultaneously decreasing response costs and increasing efficacy beliefs to motivate self-protection and adaptive, danger-controlling behavior.

Self-efficacy has been explicitly addressed only in one study that showed teen-parents that they are able to decrease their child´s risk of experiencing emotional stress in the aftermath of a fire-trauma (article #1). Self-efficacy and Response-efficacy are intertwined, which gets clearer when we look at the virtual reality interventions that showed the participants not only that escaping is an effective response upon seeing a fire, but also enhanced self-efficacy at the same time, because it was the *child* himself that performed the task correctly. To summarize, the enhancement of efficacy-beliefs was often covered by verbal communication, or by teaching people behavioral skills, such as correctly responding to fire or correctly crossing streets. These skills were taught by means of modeling and reinforcement of correct behavior.

Up to here, one could conclude that the theories were successful and effective when utilized. But the same is true for those studies using theoretical concepts only implicitly or sometimes ´by accident´. Those were not ´per se´ less effective; behalf one study that failed to teach escaping-skills to mentally retarded individuals, all interventions seen in this literature-review were said to be ´working´. The evidence-base of this assumption was more or less scientifically based; only one study had a scientifically comprehensive evaluation (article #3). Where some researchers analyzed participants´ performance on tasks such as picture-arrangements to measure intervention effectiveness, others used real outcome measures by analyzing hospital data. This lack of rigorous, scientific and conceptualized evaluation in injury prevention programs is in line with research by Trifiletti, Gielen, Sleet & Hopkins (2005). As Gielen & Sleet (2003) state, improvements over the last years have been seen, such as the utilization of randomized controlled trials and inclusion of figures on morbidity, mortality and cost impacts.

Arguably, not evaluating is a waste of time, resources and most important; one would never get an answer whether the intervention worked or not. Furthermore, without evaluation it is impossible to see whether an intervention benefitted or harmed the participants (Thompson, 1998). Future interventions should place higher priority on evaluation.

Overall, research methodology in general has been found to be quite diverse. For example, the problem of self-report versus observation is well-known in social science. In line with this, one study concluded that occupants overestimated the presence of smoke detectors in their homes, while another study came to know that people exaggerated their use of safety devices such as seat belts. Obviously, the problem lies not only in humans´ desire to answer questions in a socially accepted way, because one study found that some households reported not having smoke alarms while in fact a working smoke alarm was observed, indicating half-knowledge. Future research and interventions should acknowledge methodological issues and apply triangulation to verify information.

Nevertheless, explicit references to theories of behavior-change are still lacking in most fire prevention programs, although interventions use them implicitly. However, it seems that practitioners gradually realize the importance of utilizing at least general theories about the mind: especially interventions focusing on children acknowledged their cognitive possibilities and thusly provided a safe environment where they themselves could make their experiences. Interventions were not solely focusing on one specific person. Many programs had an environmental scale; schools (article #3, #12 and #15, families (article #3, #8 and #11), law

and judicial machinery (article #7 and #8), whole cities (article #9) and high-risk areas (article #14).

5. Practical Implications

´Tell me and I'll forget;
show me and I may remember;
involve me and I'll understand´
Confucius

Recommendations for practitioners are along the lines of the Extended Parallel Processing Model, but should be interpreted with care; at first, threat beliefs must be increased, otherwise we cannot expect any pro-active preventing behavior. To increase threat perception, severity and vulnerability are the key-concepts. To show the population how severe fire is and how vulnerable people are, it no longer makes much sense to recommend to just *say* it. People have to *see and experience* it. This does not mean that houses should be set on fire in order to teach people; practitioners and fire departments should consider, build or use safe locations and places, where they construct and simulate a normal house and *let people see* how severe fires can be and how vulnerable we are in certain situations. To further enhance beliefs of severity and vulnerability, fire departments and practitioners should consider local media; every fire that happens is an opportunity for prevention of the next one. More news-coverage in newspapers, television and on the internet is needed to socially amplify the risk. Social media sites can reach thousands of citizens if properly used.

What is of utmost importance are efficacy-beliefs. Increasing threat beliefs without simultaneously increasing efficacy-beliefs will backfire; people will deny that they are at risk and will try to control their emotions instead of controlling the danger by behaving pro-actively. Prevention-messages (e.g. ´do not extinguish a burning pan containing oil by means of water´) should be framed in a way that increases the threat-belief on the one hand, and on the other hand increases the belief that a specific response (i.e. ´use a fire blanket´ or ´shove the pan from the hotplate or cooker´) is effective in eliminating the threat (response-efficacy) and the belief that the person in question is able to carry out the recommended response (self-

efficacy). Again, just saying it to the audition is not always sufficient; people should see and experience. This could also be taught in constructed, safe environments, where fire fighters together with participants experience real fires and their countermeasures.
Another practical example of framing a message according to the knowledge gained by studying the literature will we presented in the following.

To prevent fires at all, it is e.g. recommended to disconnect electrical outlets at night. To persuade people to engage in self-protection, the first step of a prevention-practitioner should be the presentation of the seriousness and vulnerability (showing how fast a fire spreads near electrical devices, telling statistics of cases where electrical devices and short-circuits were causes of fires, telling how toxic and deadly the smoke is, telling statistics where the smoke was the cause of serious injury and death, etc.). Recall that simply speaking out facts is rarely sufficient. Thus, severity and vulnerability should be demonstrated realistically (by building safe fire-demonstration houses) or digitally, as seen in the virtual environments interventions. To enhance self-efficacy and response-efficacy, fire departments and prevention practitioners need to teach behavioral skills to their audition. Most important, the opportunity to ´respond´ to a fire and to live fire-safe should not fail on response-costs such as money; by giving away safety-devices for free, together with the teaching of installation and maintenance skills, practitioners can decrease barriers that inhibit safety-behavior.

Demonstrations by fire fighters and prevention practitioners should be within the boundaries of ethics, but sometimes a small violation of ´rules´ (i.e. ´do not create fear, but it is okay when you increase efficacy-beliefs at the same time´) would be in line with scientific findings and beneficial for the population.

6. References

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7. Database

7.2. Prevention Programs / Interventions / Evaluations

Meestal gaat het hier om brand preventie programma´s voor de algemene populatie met vaak een bijhorende evaluatie van de resultaten. Het zijn wetenschappelijke studies en interventies gericht op verschillende doelgroepen; ouderen, kinderen, brandweer leden, brandstichters, ouders, scholen of mensen met een handicap.

Titel	Waar gaat het om?
"Kids and Fires Are No Match": Fire and Trauma Prevention for Teen Parents	intervention goal was to help teen parents (N =124), from high schools and job training centers, focus on the preventive issues of fire safety and trauma prevention for themselves and their children after a difficult life event
A burn prevention program as a long-term investment: trends in burn injuries among Jews and Bedouin children in Israel	compared the pattern of burn injuries among two age groups (0±4; 5±14) of two ethnic groups of Jews and Bedouins
A cost analysis of a smoke alarm installation and fire safety education program	We conducted a retrospective cost analysis of a smoke alarm installation program in 12 funded communities across four states. Costs included financial and economic resources needed for training, canvassing, installing, and following-up, within four cost categories: (a) personnel, (b) transportation, (c) facility, and (d) supplies.
A Qualitative Evaluation of Fire Safety Education Programs for Older Adults	evaluation of six fire safety education programs for older adults delivered by public fire educators. Our main aims were to explore how these programs are implemented and to determine important factors that may lead to program success
A Randomized, Clinical Trial of a Home Safety Intervention Based in an Emergency Department Setting	randomized, clinical trial of 96 consecutive caregivers of children who were younger than 5 years. After completing a structured home safety questionnaire via face-to-face interview, caregivers were randomly assigned to receive either comprehensive home safety education and free safety devices or focused, injury-specific ED discharge instructions.
An educational intervention for police and firefighters for elders at risk: limits of education alone as a strategy for behavior change	The present study looked at a workplace intervention for police and firefighters to increase their awareness and detection of vulnerabilities of the elders whom they might encounter in their work. The data highlight the difficulty of using educators external to an organization to drive attitudinal and behavioral change within the organization.
Burn Education Awareness Recognition and Support (BEARS): A Community-Based Juvenile Firesetters Assessment and Treatment Program	Specially trained firefighters assess each child using the tool developed by the Federal Emergency Management Agency. In 2002, we assessed 42 children; 29 of those children were referred through the courts. So far, none of the children treated in our program have returned to fire-setting behaviors.
Can Fire and Rescue Services and the National Health Service work together to improve the safety and wellbeing of vulnerable older people? Design of a proof of concept study	This prospective proof of concept study, currently being conducted in two London boroughs, (Southwark and Lambeth) aims to reduce the incidence of both fires and falls in community-dwelling older adults. It comprises two concurrent 12-month interventions: the integration of 1) fall risk assessments into the Brigade's Home Fire Safety Visit and 2) fire risk assessments into Falls

	services by inviting older clinic attendees to book a Visit. Our primary objective is to examine the feasibility and effectiveness of these interventions. Furthermore, we are evaluating their acceptability and value to key stakeholders and services users.
Case Study: Using a Virtual Reality Computer Game to Teach Fire Safety Skills to Children Diagnosed with Fetal Alcohol Syndrome	Children participated in a study by using a multiple baseline, multiple probe design. Before the game, no child could correctly describe what actions to take during a home fire. A computerized game allowed them to learn the recommended safety steps in a virtual world. Skill learning and real-world generalization were tested immediately after the intervention and at 1-week post-test. All children reached 100% accuracy on the computer intervention, defined as successfully completing each of the safety steps. At the 1-week follow-up, all the children were able to perform the steps correctly in a real world simulation.
Children's acquisition and retention of safety skills: the Lifeskills program	Assessment of safety skills performance and knowledge, to evaluate the education offered by the Lifeskills ''Learning for Living'' village, Bristol, UK which emphasizes interactive learning-by-doing. Two quasi-experimental matched control group studies. Study 1: knowledge and performance three months post-intervention. Study 2: knowledge pre-intervention and post-intervention at three time points, to distinguish between immediate learning and longer term retention. Study 1: Lifeskills/intervention children did better than control children on performance and knowledge tests. The knowledge-performance correlation was r = 0.51. Study 2: intervention children did better than control children immediately after the intervention and three months later on all five knowledge tests. On three tests the intervention group showed retention of knowledge from immediately postintervention to three months, but on two tests there was some loss.
Comprehensive Smoke Alarm Coverage in Lower Economic Status Homes: Alarm Presence, Functionality, and Placement	to estimate smoke alarm coverage and adherence with national guidelines in low- to mid-value owner-occupied residences, and to identify resident demographic, behavioral, and building characteristics and other fire and burn safety practices associated with smoke alarm utilization. Baseline visits were conducted with 779 households in King County, Washington, for a randomized trial of smoke alarm functionality. Presence, functionality, features, and location of pre-existing smoke alarms were ascertained by staff observation and testing.
Decreased Juvenile Arson and Firesetting Recidivism after Implementation of a Multidisciplinary Prevention Program	Trauma Burn Outreach Prevention Program (TBOPP), which focuses on the medical and societal consequences of firesetting behavior. The basis for this program development was a 17% increase in pediatric burn admissions. The purpose of this study was to determine the value of this trauma burn center prevention program from a financial, clinical, and recidivism perspective. A random control group that did not receive TBOPP education (noTBOPP group) with identical entry criteria was used for comparison. TBOPP participants had essentially no recidivism.
Design and implementation of injury prevention curricula for elementary schools: lessons learned	A pilot program was developed, implemented, and evaluated in six intervention and six control schools. The curriculum was revised and implemented in five other schools and finalized according to evaluation results and teachers' and parents' suggestions. Community resources such as police, fire, and county health departments participated in program implementation.
Do smoke alarms still function a year after installation? a follow-	Before the study began, 60.6 percent of these homes had smoke alarms, but only 36.6 percent had functioning smoke alarms. The follow-up study

up of the get-alarmed campaign	was designed to determine the experiences of participants with smoke alarms and whether participating households had functioning smoke alarms a year after baseline. Over 75 percent of respondents had smoke alarm sound offs in the prior year, predominately due to cooking smoke, but only about 5 percent reported removing the battery or otherwise disabling it to prevent sound offs. However, the measures taken may render a household unprotected at a critical time.
Education and Treatment for Boys Who Set Fires: Specificity, Moderators, and Predictors of Recidivism	In a treatment outcome study with young boys referred for firesetting that compared brief home visitation from a firefighter, fire safety education (FSE), and cognitive–behavioral treatment (CBT), we examined the specificity, potential moderators, and predictors of recidivism. FSE exerted specific effects on some fire knowledge and safety measures, as expected; CBT tended to show specific effects only on positive problem solutions. Potential moderators of FSE and CBT were suggested in an exploratory analysis (e.g.,exposure to fire models/materials, child's general fire knowledge, and family functioning). Fire history, fire attraction, and externalizing behaviors were among the predictors of firesetting recidivism.
Effect of a Targeted Education Intervention on the Incidence of Waste-Burning Injuries in a Military Population	to determine the incidence of burns incurred while burning waste during U.S. military operations prior to and following an intervention targeted at reducing such injuries. The intervention consisted of memoranda outlining potential dangers and suggesting improved safety procedures. It was distributed to the combat theater (Iraq and Afghanistan) in March 2004. We reviewed military burn center records from March 2003 to March 2005. Demographics, injury data, and outcomes were recorded and compared between those casualties injured prior to and following the initiative. The incidence of 1.67 per month was significantly ($P < .05$) higher than that seen the year after the intervention (four patients, 0.33 per month).
Efficacy of Cognitive-Behavioral Treatment and Fire Safety Education for Children Who Set Fires: Initial and Follow-up Outcomes	Assessments were conducted with 38 children who were randomly assigned to CBT or FSE and with another 16 children who received a brief intervention (home visit from a firefighter or HVF) that paralleled routine services. Measures in four domains related to the child's fire history were obtained from children and their parents at pre-treatment, post-assessment, and 1-year follow-up. There were several improvements at post-treatment for all conditions on measures of fire involvement, interest, and risk. However, CBT and FSE were more efficacious than HVF on certain measures, including the frequency of firesetting and proportion of children playing with matches, severity of individualized problems with fire, and involvement in fire-related acts and other deviant fire activities. These and other group differences, along with certain time effects, were evident at 1-year follow-up.
Evaluating Injury Prevention Programs: The Oklahoma City Smoke Alarm Project	The distribution of free smoke alarms in targeted neighborhoods was accompanied by written educational pamphlets and home-based follow-up to test whether the alarms were functioning correctly. During the six years following the project, the residential fire-related injury rate decreased 81 % in the target population but only 7 % in the rest of Oklahoma City. This dramatic decline in fire-related injuries in the target area is largely attributed to the free smoke alarm distribution as well as to educational efforts promoting awareness about residential fires and their prevention.
Evaluation of Fire-Safety Programs	Smoke Alarm Installation and Fire Safety Education (SAIFE) program in

that use 10-Year Smoke Alarms	1998. This program involves the installation of lithium-powered ‘‘10-year’’ smoke alarms in homes at high risk for fires and injuries. This study aimed to (1) determine among original SAIFE homes if the lithium-powered alarms were still present and functional 8–10 years after installation and (2) understand factors related to smoke alarm presence and functionality. Data on a total of 384 homes and 601 smoke alarms in five states were collected and analyzed. Only one-third of alarms were still functional; 37% of installed alarms were missing; and 30% of alarms were present, but not functioning.
Welcome to the World Findings From an Emergency Medical Services Pediatric Injury Prevention Program	To report findings from a primary prevention program that trained paramedics to conduct home safety surveys, provide family safety education, and identify common pediatric injury risks in the home. Participating families had high rates of fire/burn hazards and unsafe storage practices. Paramedics can recognize common hazards in the home, can provide education and mitigation to reduce risks of pediatric injury, and can distribute home safety devices in a community injury prevention program.
Fire Safety Skills Training for Individuals with Severe and Profound Mental Retardation	to evaluate behavioral skills training procedures for teaching individuals with severe and profound mental retardation to exit their residence upon hearing a smoke detector. Assessments took place in the participants’ group homes while the participants were unaware that an assessment was taking place. Training consisted of behavioral skills training and in situ training. Following training, it was anticipated that the participants would be able to initiate exiting behaviors within 10 s of the activation of a smoke detector and exit the building within 30 s of initiating exiting behaviors.
Games that ‘‘work’’: Using computer games to teach alcohol-affected children about fire and street safety	Although teaching safety skills is recommended to prevent injury, cognitive limitations and behavioral problems characteristic of children with fetal alcohol spectrum disorder make teaching these skills challenging for parents and teachers. In the current study, 32 children, ages 4–10, diagnosed with fetal alcohol syndrome (FAS) and partial FAS, learned fire and street safety through computer games that employed ‘‘virtual worlds’’ to teach recommended safety skills. Children were pretested on verbal knowledge of four safety elements for both fire and street safety conditions and then randomly assigned to one condition. After playing the game until mastery, children were retested verbally and asked to ‘‘generalize’’ their newly acquired skills in a behavioral context. They were retested after 1 week follow-up. Children showed significantly better knowledge of the game to which they were exposed, immediately and at follow-up, and the majority (72%) was able to generalize all four steps within a behavioral setting. Results suggested that this is a highly effective method for teaching safety skills to high-risk children who have learning difficulties.
Home delivery of an injury prevention kit for children in four French cities: a controlled randomized trial	N=100 families from four towns in the Paris suburbs were visited at home by nurses or doctors when their child reached 6–9 months. Selection criteria were: primipara, medical problem, psychological, and/or socioeconomic difficulties.Interventions: During the first visit, 50 families (group 1) received counselling and a kit including preventive devices and pamphlets about indoor injuries and ways to avoid them. The other 50 families (group 2) received counselling but not the kit. A second home visit was made 6–8 weeks later. Results: Between the first and the second visits, safety improvement was significantly higher in the group with the

	kit.
Impact of a community based fire prevention intervention on fire safety knowledge and behavior in elementary school children	to determine the impact of a community based fire prevention intervention directed only to parents on the fire safety knowledge and behavior in elementary school children. This was a prospective, quasirandomized controlled study in which third and fourth grade students from two elementary schools in an urban, poor, minority community completed knowledge/behavior surveys at baseline and following completion of the intervention. The intervention group received an in-home visit from fire department personnel who installed free lithium smoke detectors and provided a fire escape plan. After accounting for a small difference in baseline summary scores of knowledge and behavior between the control and intervention groups, this study found a modest improvement in fire safety behavior among children whose families received a fire prevention intervention reflecting a change in household fire safety practices. However, there was no significant change in fire safety knowledge.
In Search of Effective Education in Burn and Fire Prevention	Burn and fire educators must find a way to reach children that captures their imaginations. There may be no better way than games. Two burn and fire prevention games were developed. The games were distributed to 38 school districts encompassing a total of 164 elementary schools and reaching more than 1,035 youngsters in grades 1 through 4 in a two-county community. Before playing each game, the participants completed a multichoice pretest. A similar posttest was administered after gaming to determine mastery and retention of knowledge. In addition, classroom instructors were given an evaluation form to assess content, quality, and effectiveness. Pretest and posttest results indicated students gained and retained significant knowledge. Instructor evaluation recognized these games as entertaining and exciting.
Interdisciplinary Knowledge Translation: Lessons Learned from a Mental Health: Fire Service Collaboration	The present study examined the adopter, innovation, and dissemination characteristics associated with TAPP-C(The Arson Prevention Program for Children) implementation, protocol adherence and extent of collaboration by 241 community-based fire service professionals from communities across Ontario. Results revealed that dissemination factors are particularly important for understanding program implementation, adherence and cross-discipline collaboration. Moreover, the findings of this study show significant benefits to both within discipline (intra-disciplinary) and across discipline (interdisciplinary) knowledge translation strategies.
Islam for fire fighters – A case study on an education program for emergency services	This paper describes an initiative by the Fire and Emergency Services Authority of Western Australia to build its capacity to deal appropriately with an increasingly visible, and marginalized, minority - the Muslim community- through a program designed to raise awareness and understanding among its staff. This paper describes the social, political and organizational context in which the training was developed, and reflects on the personal experiences and lessons learnt by the program developers.
Preparing for Burn Disasters: Evaluation of a Continuing Education Training Course for Pre-hospital and Hospital Professionals in Kansas	Evaluating an education program designed to provide licensed health care practitioners a training opportunity for multiple burn victim incidents, emphasized the challenges that the community-wide multidisciplinary team faces when responding to burn disasters. A prepost survey design was used to assess changes in participants' knowledge and self-rated ability, confidence, and competence to perform in a burn disaster before and after training.

Prescribed burning in Catalonia: fire management and research	The most relevant achievements in prescribed burning during its six years of application will be presented in this paper
Prevention of burns: 13 years' experience in Northeastern India	This study, undertaken in the remote corner of Northeastern India, aims at reducing the incidence of burns through focused attention towards sensitizing the community with well-structured preventive programs. Participatory community seminars, shop floor visit to industrial locations, use of print and electronic media and lectures and demonstrations in schools were the tools used in the preventive program.
Randomized controlled trial of ionization and photoelectric smoke alarm functionality	Randomized controlled trial of 761 households. An ionization or photoelectric smoke alarm was installed between June 1, 2000 and July 31, 2002. Main outcome measures were: percentage of study alarms that were working, observed reasons for non-functional status, and self-reported frequency of nuisance alarms at 9 and 15 months of follow-up. Results suggest that the selective use of photoelectric alarms by fire injury prevention programs or consumers may provide longerterm protection in similar populations. Designing smoke alarms that minimize nuisance alarming may also result in longer term functionality.
Remembering when: a fall and fire prevention Program for older adults	Anecdotes from a campaign.
''Risk Watch'': Cluster randomised controlled trial evaluating an injury prevention program	The ''Risk Watch'' program delivered by teachers, aimed at improving bike and pedestrian, falls, poisoning and fire and burns safety. Main outcome measures: Safety knowledge, observed safety skills and self-reported safety behaviour. The Risk Watch program delivered by teachers in primary schools increased some aspects of children's safety knowledge and skills and primary schools should consider delivering this program.
Scald Prevention Campaigns: Do They Work?	to quantify the effectiveness of the Queensland _Hot Water Burns Like Fire_ campaign. Cross-section temperature sampling of households' bathroom hot water taps was conducted in Brisbane in 1990 before the intervention (n =872) and in 2002 to 2003 after the intervention (n =871). In both surveys, temperature was measured with thermometers held under running water from the bathroom hot tap until the reading stabilized (2 minutes). The results of this study suggest that the Queensland "Hot Water Burns Like Fire" campaign has not led to a significant reduction in hot water temperature or scald injury rates.
Smoke alarm ownership and installation: a comparison of a rural and a suburban community in georgia	As part of a smoke alarm giveaway and installation program (The Get-Alarmed Campaign),a total of 454 households were surveyed in two counties in Georgia,one metropolitan and one nonmetropolitan. The targeted communities in these counties had a high prevalence of low-income and minority populations and thus were at high risk of house fire-related morbidity and mortality. The objectives of the program were to determine the prevalence of and predictors for installed,functioning smoke alarms,and to install at least one smoke alarm and/or smoke alarm batteries in 100% of participating homes in need. This project illustrates the usefulness of a door-to-door campaign in increasing smoke alarm ownership in both a rural and a suburban community
Strategies to increase smoke alarm use in high-risk households	A 3-year project was undertaken to evaluate two methods of promoting residential smoke alarm installation and maintenance in high risk households across the U.S. Five states. The two strategies under study were direct installation of smoke alarms and distribution of a voucher for free smoke alarms. The target population included occupants of high-risk households without working smoke alarms who were approached as part

	of a door-to-door canvassing program. Fire Safety education was provided to both groups. A follow up assessment conducted 6–12 months post intervention assessed the presence and functional status of smoke alarms in each of the two groups. Demographic and fire safety data were also collected at baseline and follow up for each group. 4,455 households were enrolled in the study.
Sustainability of an In-Home Fire Prevention Intervention	This project assessed the sustainability of a Community-based fire prevention intervention on household fire safety knowledge and practices; prospective, cohort study including preintervention and postintervention surveys, assessing participants' fire safety knowledge and behavior. The implementation of an in-home visit to educate parents of third- and fourthgrade students on escape planning coupled with the installation of smoke alarms can be successful in increasing basic fire safety knowledge and household fire safety practices.
The Design and Development of Fire Edutainment Software and Its Application Research	During fire education, because of the particularity of the fire scene, learners are difficult to truly grasp and apply the relevant knowledge. This study develops game-based educational software. -The learners can better grasp the fire-fighting skills in a more real scene. Game-based learning software saves costs and points out the direction of future educational software.
The Development of the Residential Fire H.E.L.P. Tool Kit: A Resource to Protect Homebound Older Adults	This article describes the development of the Fire H.E.L.P. tool kit for training selected Meals On Wheels (MOW) staff in Texas to implement a fire safety program for homebound older adults. During pilot test, MOW participants showed enhanced fire safety knowledge and high levels of confidence about applying their newfound training skills. After the pilot test, MOW staff used the tool kit to conduct local training sessions, provide fire safety education, and install smoke alarms in the homes of older adults.
Two-year evaluation of fuelbreaks grazed by livestock in the wildfire prevention program in Andalusia (Spain)	a streamlined monitoring system is proposed to evaluate grazing in fuelbreaks. Regarding fuelbreak characteristics, larger shrub volumes were found to negatively affect the accomplishment of grazing objectives.
Using the Theory of Planned Behavior and a Stage Model of Persuasion to Evaluate a Safety Message for Firefighters	examines: (a) the ability of the theory of planned behavior (TPB) to predict behavioral intentions for firefighters receiving an occupational safety and health message & (b) the use of a persuasion output matrix to assess message impact. Message nationally distributed to 36,000 fire chiefs, 781 randomly selected to complete survey assessing message impact and behavioral intentions. --> message impact was weakest at the exposure, recall, and action stages of persuasion output. - TPB variables found to significantly predict safety intentions.
Virtual reality for life skills education: Program evaluation	Program evaluation for a Virtual Reality (VR) pilot project intended to aid deaf children in learning life skills (crossing the street safely, exiting a building during a fire drill, and avoiding situations in which strangers may harm them). N=50 (ages 5-10). The system overall was well liked and user-friendly as evidenced by the students' ability to complete the tasks accurately and enthusiasm to participate in the project; some shortcomings were identified.
What picture is worth a thousand words? A comparative evaluation of a burn prevention	Examine the effect of a visual one-session burn prevention program (different mediums) & the possibility that fear motivates action only when someone feels confident in his/her ability to control the threat.

programme by type of medium in Israel	sample of 12/13-year-old (n =179); differed in the type of medium used: slides (S), video (V), or both (S+V); measured health beliefs (perceived threat, internal/external control, self-efficacy) and sense of coherence,before and 2 months after intervention & post-program fear reaction and the improvement in burn-related knowledge. -> S group=highest level of post-exposure fear and a decrease in luck control over injuries; S+V= lowest within change; self-efficacy, fear, higher socio-economic status and female gender predicted improvement.
Wildfire Research in an Environmental Hazards Course: An Active Learning Approach	Project to implement learning strategies to encourage students to be active in wildfire hazards research. The student-based evaluation of the project and its outcomes highlights the ways in which this approach can increase understanding of local hazard scenarios, familiarity with relevant theory, geographical knowledge, and skills in research.
Wildland forest fire smoke: health effects and intervention evaluation, Hoopa, California, 1999	- assess the health effects of exposure to smoke from wildfire; observational study, review of medical records, survey interviews N=289. During the weeks of the forest fire, medical visits for respiratory illnesses increased by 52%.
Working Toward the Elimination of Residential Fire Deaths: The Centers for Disease Control and Prevention's Smoke Alarm Installation and Fire Safety Education (SAIFE) Program	To address residential fires and related injuries: - installing long-lasting smoke alarms, and providing general fire safety education and 6-month follow-up to determine alarm functionality. -> more than 212,000 smoke alarms have been installed in more than 126,000 high-risk homes;, approximately 610 lives have potentially been saved as a result of a program alarm that provided early warning to a dangerous fire incident.

7.2.1. References

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7.3. Data / Risk Factors

Meestal gaat het hier om wetenschappelijke artikelen die data analyseren om bepaalde risico factoren te weten te komen. Denk hier b.v. aan het analyseren van ziekenhuis cijfers omtrent slachtoffers van brand om uitspraken over de epidemiology van kwetsuren en sterftecijfers en daarmee geassocieerdt gevaarlijk gedrag te kunnen geven. Verder zijn hier ook studies te vinden die statistieken over brandmelders vermelden.

Titel	Waar gaat het om?
A burn prevention program as a long-term investment: trends in burn injuries among Jews and Bedouin children in Israel	Compared the pattern of burn injuries among two age groups (0±4; 5±14) of two ethnic groups of Jews and Bedouins
A small-area population analysis of socioeconomic status and incidence of severe burn/fire-related injury in British Columbia, Canada	The purpose of this study is to determine the extent to which socioeconomic status (SES) is linked to risk of burn in the province of British Columbia. The results from this study illustrate that burns disproportionately affect populations of greater relative socioeconomic disadvantage and continued efforts to also address social inequities and their link to injury incidence is likely to be more effective than targeting individual behavior alone when trying to reduce and eliminate their occurrence.
Adult Campfire Burns: Two Avenues for Prevention	We performed a retrospective review of adult patients admitted with campfire burns to our burn center from July 1998 to July 2003. Medical records were reviewed with attention to mechanism of injury, intoxication level, burn size, and surgeries performed. A total of 27 patients with this injury were treated as inpatients over the course of the study period. Two distinct mechanisms of injury emerged: 1) contact with the campfire and 2) flash/flame injuries from igniting the fire. Eighty-one percent (13/16) of patients who sustained contact burns were intoxicated, as compared with 11% (1/11) of those who sustained flash/flame injuries. Nearly half of the patients with contact burns and more than half the patients with flash/flame burns required excision and grafting.
An Examination of Public School Safety Measures Across Geographic Settings	Of the various safety measures assessed, fire alarms and extinguishers were consistently reported regardless of the geographic region or community setting of the school. Other than measures for fire safety, schools throughout the country routinely used exterior light and student lockers as safety measures.
Ashes to ashes: Thermal contact burns in children caused by recreational fires	Cases of thermal contact injury in children due to recreational fires were reviewed and the potential of a small charcoal fire to cause burns over a prolonged period was tested. Between 1993 and 2007, 67 children were admitted for treatment, with a median age of 1.6 years. Total burn surface area ranged from 0.5% to 19.5% (median 4%) with burns most commonly affecting the hands and feet. The average length of stay was 7 days and a total of 81 surgical procedures were carried out. Injury was most commonly sustained after falling into (40%), or accidentally crawling or walking on (30%), the remnants of an unextinguished fire. Small charcoal fires retain sufficient heat to cause injury at least 16 h after lighting. Strategies for prevention of these injuries are outlined.
Beach and Campfire Burns: A Site of Pleasure and Tragedy	objective of this study to quantify and better identify those factors that lead to these injuries. A retrospective review of patients injured from a beach or

	campground, fire pits, or bonfires was conducted using data from a regional burn registry (1999–2007). 84% were men. Ages fell into two discrete groups; young age (2–9 years) and adults (18–64 years). Alcohol was a contributing factor in 60.6% of adult burns. Universal safeguards to prevent burn injury should be implemented, including designated areas for fires, protective mechanical barriers to keep children and adults from inadvertently walking or falling into the fire pit.
Burn disasters in the middle belt of Ghana from 2007 to 2008 and their consequences	Data were collected from clinical records from the Burns Intensive Care Unit and the Casualty Unit of the Komfo Anokye Teaching Hospital, Kumasi, Ghana and from the various disaster sites and the Ghana Police Service. total of 212 were injured from four burn disasters; 37 (17%) died on the spot; 175 (83%) reported to the Casualty Unit out of which 46 (26%) were admitted. The victims admitted had mean age 24.6 years with male to female ratio 2.3:1; 25 (54%) of the admitted victims died. Death and severe disability of victims of future disasters can be avoided if intensive road accident preventive measures and massive public education are encouraged.
Burn Injury in Utah: Demographic and Geographic Risks	to determine the risk of burn injury to Utah residents, identify demographic and geographic subgroups at increased risk, and to examine sociodemographic factors associated with risk. Probabilistic record linkage of databases from five states was performed to identify Utah residents burned over a 5-year period and to calculate the burn rates and risk. Geographic Information Systems mapping allowed for the identification and characterization of high risk areas. Men had a higher rate of injury than women. Children under the age of 5 years had the highest rate of burn injury. Adults aged > 65 years had the lowest rate.
Burn mortality in Bangladesh: Findings of national health and injury survey	Nationally representative data was collected from 171,366 rural and urban households, comprising of a total population of 819,429. Overall mortality burn rate was 2.2 per 100,000 populations per year. The rate was higher amongst females. Most of the deaths were accidental in nature, only 5% of deaths were from selfinflected burn. The rate was higher amongst the rural population compared to the urban population. About 90% of the burn incidences were at home with the kitchen the most frequent place at home for burn incidence to occur. A majority, 89%, of the deaths were caused by flame burn. Cooking fire, heating fire and fire from kerosene lamps were the major sources of flames. The majority of burn deaths occurred during winter season. Conclusion: Burn is a considerable cause of death in Bangladesh. Females, rural dwellers and populations of low socioeconomic condition are more vulnerable to burn injury
Campfire burns in children: an Australian experience	Departmental database and case note review of all children with campfire burns seen at the Burns Unit of a tertiary referral children's hospital between January 1999 and June 2001. To document and describe the effects of campfire burns on children. To identify the sources of danger contributing to such injuries, so that a prevention strategy can be devised. Campfires cause serious injuries to children. In particular, hot ashes and coals from inadequately extinguished campfires pose the greatest danger
Characteristics of paediatric burns seen at a tertiary centre in a low income country: A five year (2004–2008) study	This study identifies the main causes of paediatric burns and the major factors responsible for morbidity and mortality at the present time in a low income country(Nigeria).
Comprehensive Smoke Alarm	to estimate smoke alarm coverage and adherence with national guidelines

Coverage in Lower Economic Status Homes: Alarm Presence, Functionality, and Placement	in low- to mid-value owner-occupied residences, and to identify resident demographic, behavioral, and building characteristics and other fire and burn safety practices associated with smoke alarm utilization. Baseline visits were conducted with 779 households in King County, Washington, for a randomized trial of smoke alarm functionality. Presence, functionality, features, and location of pre-existing smoke alarms were ascertained by staff observation and testing.
Do smoke alarms still function a year after installation? a follow-up of the get-alarmed campaign	Before the study began, 60.6 percent of these homes had smoke alarms, but only 36.6 percent had functioning smoke alarms. The follow-up study was designed to determine the experiences of participants with smoke alarms and whether participating households had functioning smoke alarms a year after baseline. Over 75 percent of respondents had smoke alarm sound offs in the prior year, predominately due to cooking smoke, but only about 5 percent reported removing the battery or otherwise disabling it to prevent sound offs. However, the measures taken may render a household unprotected at a critical time.
Ecological level analysis of the relationship between smoking and residential-fire mortality	To examine the association between tobacco smoking and residential-fire mortality. Conclusions: Mortality from residential fires is high in states with high smoking rates.
Epidemiology and Profile of Pediatric Burns in a Large Referral Center	Data from the burn registry were collected over a 9-year period. Cross-tabulations were employed to examine associations. An analysis of variance model was used to examine differences in injury pattern. Results: Burns in children less than 1 year accounted for 16% of all admissions. The most common mechanism of injury was scalds (48.4%). Electrical and chemical burns occurred more often in older children. Suspected abuse (N = 142) accounted for 6.7% of all admissions. House fire injuries (N = 94) had a higher mean total burn surface area (18.2%). Smoke detectors were present in two thirds of the cases. Conclusions: These predictors can form the basis for targeted public health initiatives with a potential reduction in the number of burn injuries.
Epidemiology of paediatric burn injuries in Hamadan, Iran	The median age was 3 years with 69% of the patients under 4 years. The male-to female ratio of incidence rate for all age groupswas1.52. Scald was the leading cause in almost all age groups and caused 266 (71.7%) burns. Correlation analysis showed that younger children are more vulnerable to scald injury. The mean body surface area (BSA) of burns was 16.36 (SD = 11.42) in all cases. Flame was more fatal than other causes of burns. The total fatality rate in this study was 3.5%. Epidemiological findings reveal that scald, age, gender and residence in rural area are the major issues that should be discussed in considering childhood burns. Prevention efforts should focus on the reduction of scald injuries during food preparation or hot liquid spillage. These efforts should target rural infants, toddlers and boys.
Epidemiology of Pediatric Burns Requiring Hospitalization in China: A Literature Review of Retrospective Studies	Examine the nationwide data available on pediatric burns requiring hospitalization to reveal burn epidemiology and guide future education and prevention. a high proportion of hospitalized patients with burn injury were children; those who were male, aged _3 years, and lived most of the time indoors were especially susceptible. Great attention should be paid when hot water is used or during suppertime.
Fatal and non-fatal fire injuries in England 1995–2004: time trends and inequalities by age, sex and area deprivation	A cross-sectional study and time trend analysis using data on fire casualties in England between 1995 and 2004 There were significant reductions in fatal and non-fatal fire injuries in children, adults and older people between 1995 and 2004. Adult and child fire deaths were most commonly caused by

	smokers' materials (e.g. cigarettes, cigars and tobacco), and cigarette lighters and matches, respectively. Cooking appliances caused most non-fatal fire injuries. Injury rates increased with increasing levels of deprivation and deprivation gradients did not change over 10 years.
Fire deaths in children in South Australia from 1989 to 1998	A total of 23 deaths of children occurred with an age range of 2 months to 16 years (mean 5 years 10 months; M:F = 13:10). Fourteen deaths were associated with house fires, four with fires in cars and four were miscellaneous or unspecified. While house fire deaths remained the major cause of childhood fire deaths (65%), deaths in car fires accounted for a significant proportion of cases (17%). Although the numbers are small, cars represented a specific danger because of their confined space with highly flammable interiors, lockable doors, and built in non-childproof lighters. Cars should not be regarded as suitable places to leave young children, or for children to play in unsupervised.
Fire Fatalities Among Children An Analysis Across Philadelphia's Census Tracts	Authors analyzed 246 deaths from 146 residential fires by census tract. Significant variables were low income households, single-parent households with children younger than 18, houses built before 1939 and number of children younger than 15 years.
Fire jumpers: description of burns and traumatic injuries from a spontaneous mass gathering and celebratory riot	To describe the interesting injury mechanism of celebratory fire jumping and to describe the injuries associated with two celebratory riots. Methods: We conducted a cross-sectional study analyzing all Emergency Medical Services (EMS) and hospital reports of injuries associated with each gathering.
Flame burn admissions and fire fatalities in Scotland with particular reference to the Strathclyde (Glasgow) region, and their prevention	The data from the burns unit at Glasgow Royal Infirmary were studied to find the number of admissions due to flame burns and see how it compared with the fire deaths. In the Glasgow region 50% of the domestic fires leading to non-fatal burns or to death were started by misuse of smoking materials. Chip pan fires were responsible for 8% of admissions to the burns unit.
Geographic mapping as a tool for identifying communities at high risk of fire and burn injuries in children	Although industrialized countries have achieved significant declines in deaths and hospitalizations for these injuries in recent decades, the benefits have not been shared equally by children across all socioeconomic groups. We used Bayesian methods to map posterior expected relative risks, as an estimate of smoothed hospital separation ratios for fire and burns in children, across local government areas in New South Wales, Australia. The geographic pattern of relative risk varied by age group; higher than average risks were observed for children residing in rural and remote areas, as well as in scattered local government areas closer to the coast and in some metropolitan regions. Mapping the occurrence of injury gives injury practitioners the opportunity to identify high risk communities for further investigation of risk factors and implementation of targeted interventions within a defined area.
Healthcare Resource Utilization and Epidemiology of Pediatric Burn-Associated Hospitalizations, United States, 2000	to describe the epidemiology and financial burden of burn associated hospitalizations for children younger than 18 years in the United States. Retrospective data analysis of pediatric burn-associated hospitalizations was done. Children 2 years old or younger were more likely to be nonwhite, be hospitalized for burns, and burn their hands/wrists, compared with children 3 to 17 years of age. Male children in both age groups were more likely to be hospitalized for burns than female children. Children 2 years old or younger were more likely to be burned by hot liquids/vapors and contact with hot substances/objects, while children 3 to 17 years were more likely to be burned by fire/flames.

Home safety measures and the risk of unintentional injury among young children: a multicentre case–control study	We conducted this case-control study using records from 5 pediatric hospital emergency departments for the 2-year period 1995–1996. The 351 case subjects were children aged 7 years. A home visitor, blinded to case-control status, assessed 19 injury hazards at the children's homes. we found that cases differed from controls for 5 hazards: the presence of a baby walker, the presence of choking hazards within a child's reach, no child-resistant lids in bathroom , no smoke alarm and no functioning smoke alarm.
Hot Cooking Oil Burns: A 20-Year Experience	Data from 316 admissions to the Burns Unit at The Royal Brisbane Hospital. The lack of predisposing factors and the accidental nature of these burns mean appropriate prevention strategies are paramount to decreasing the number of burns of this type. Suggestions discussed include school-based education programs, warning labels included in product information, and mandatory fire blankets within the home.
ICU fire evacuation preparedness in London: a cross-sectional study	A cross-sectional survey of all 50 adult and paediatric IntensiveCareUnits within the London Postgraduate Deanery was conducted; neonatal units were excluded. The senior nurse at each unit was asked to complete a 90-question structured questionnaire, covering unit patient characteristics, design, equipment, training, and their evacuation plan. Significant weaknesses were reported in unit design, equipment, training, and planning, threatening patient and staff safety.
Income, Housing, and Fire Injuries: A Census Tract Analysis	The author analyzed 1,563 fire injuries by census tract using the 1990 census. Multiple regression was used to determine significant variables in predicting fire injuries in a given census tract over a nine-year period and interaction effects between two of these variables—age of housing and income. analysis indicates that older housing (prior to 1940), low income, the prevalence of vacant houses, and the ability to speak English have significant independent effects on fire injury rates in Philadelphia.
Injury mortality among ethnic minority groups in the Netherlands	comprehensive overview of ethnic differences in injury related mortality in the Netherlands and to determine the role of area income and urbanisation degree. Data for the period 1995-2000 were obtained from the population and cause of death registries. Injury related death rates were compared for persons from Turkish, Moroccans, Surinamese, and Antillean/Aruban origin with rates for the native Dutch population. Compared with the native Dutch population, all ethnic minorities combined had an increased mortality for all injuries together. Inequalities in injury mortality were the highest among children and young adults, but persisted in the age group above 50 years old.
Injury-Related Unsafe Behavior Among Households from Different Socioeconomic Strata in Pune City	Behaviors influencing the risk of burn, poisoning, drowning, and road traffic injuries were questioned from 200 randomly selected households. Results: Nearly 28% of the households did not have a separate kitchen, 37.5% cooked at the ground level, 33.5% used a kerosene pressure stove, 12% used unprotected open fire as a source of warmth in winter, and 34.5% stored inflammable substances at home. Ninety one percent of the households reported storing poisonous chemicals in places that could not be locked. In 68.3% of the households with children below five years, these chemicals were kept in places accessible to children. Nearly 21% of the individuals, who could swim, did so in unsafe places and 25.2% of them were not trained in swimming. In 35.5% of the households, children used streets as playgrounds. Among all two-wheeled vehicle riders, 35.6% reported not having a helmet and 57.7% of those who had a helmet did not

	use it regularly. Socioeconomic status was strongly associated with the unsafe behaviors related to burns, drowning, and road traffic injuries.
Optimizing Emergency Awakening to Audible Smoke Alarms An Update	This review examines research on arousal from sleep in an emergency. It considers whether the current smoke alarm signal is optimal for waking those most at risk of dying in a fire and, if not, how it may be improved. Significant risk factors for staying asleep include high levels of background noise, being a heavy sleeper, sleep deprivation, being a child, hypnotics, alcohol intoxication, and hearing impairment. The high frequency beeping signal was significantly less effective than either a voice alarm or mixed-frequency beeping in waking selected at-risk groups.
Outdoor Recreational Fires: A Review of 329 Adult and Pediatric Patients	Patients who presented to Spectrum Health Blodgett Regional Burn Unit for burns secondary to an outdoor recreational fire over an 8-year period were reviewed. The most common mechanism of injury in both adult and pediatric populations was falling into an ongoing fire. Wound Infection was the most common complication. Alcohol intoxication was associated with a higher burn severity and complication rate. Pediatric patients represented 39.8% of the sample. Burns secondary to outdoor recreational fires are associated with significant morbidity.
Pediatric fire deaths in Ontario Retrospective study of behavioural, social, and environmental risk factors	The study retrospectively reviewed the coroner's case files for 60 subjects who qualified according to the selection criteria. Fire play and electrical failures were the top 2 causes of residential fires. More fires occurred during the night (midnight to 9 AM) than during the day (9 AM to midnight). Nighttime fires were most commonly due to electrical failures or unattended candles, whereas daytime fires were primarily caused by unsupervised fire play and stove fires. Smoke alarms were present at 32 of 39 fire events (82%), but overall alarm functionality was only 54%. Risk factors for pediatric fire death in Ontario include smoke alarm functionality, fire play, fire escape behaviour, and CAS involvement.
Pediatric Injuries Associated With Fireplaces, United States, 2002-2007	To examine injuries among pediatric patients treated in an emergency department (ED) related to contact with a fireplace. Data were obtained from the National Electronic Injury Surveillance System for the years 2002 through 2007.
Perceived Risk of Home Fire and Escape Plans in Rural Households	Forty-two percent of rural households reported having a fire escape plan. Of the households with a plan, less than two thirds (56.9%) discussed or practiced the plan. Households with children were more likely to develop and practice a fire escape plan. Households with an elderly or disabled person were less likely to develop or practice the plan. Compared to respondents who perceived low or very low risk of home fire, those who perceived a high or very high risk had 3.5 times greater odds of having a fire escape plan and 5.5 times greater odds of discussion or practicing their plan.
Playing with fire and getting burnt—a retrospective analysis of injuries presenting to the emergency department during 'firework season'	The author conducted a retrospective study in the emergency department in Exeter from October 2006 to January 2007 highlighting 18 firework-related injuries.
Playing with fire — a significant cause of burn injury in children	We report our experience with 50 patients who were burned as a result of playing with fire over the period of January 1993 to December 1999. Wax and fireworks were recognized as the two major burn causing agents in these 50 patients.
Population-Based Assessment of	to determine the epidemiology of nonfatal burn injuries in a largely rural

Burn Injury in Southern Iowa: Identification of Children and Young-Adult At-Risk Groups and Behaviors	region of a midwestern state to target intervention efforts at populations and injury mechanisms at risk. A total of 1430 emergency room visits were identified, with 1382 records available for review. Injuries were grouped into etiology subcategories to better delineate common mechanisms and determine methods of prevention.
Predictors of Sustaining Burn Injury: Does the Use of Common Prevention Strategies Matter?	few studies evaluate the effectiveness of implementing standard burn prevention strategies in preventing burn injury. The authors hypothesized that patients who sustain burns use burn prevention strategies less frequently than those who do not. This was a case-control study composed of a prospective survey questionnaire and retrospective burn registry query, which was performed in a suburban academic medical center with a burn unit. All burn patients seen by the burn service in the year 2008 and a nonrandom sample of nonburned emergency department patients and visitors during the same time period were enrolled. Patients who sustain burn injury use burn prevention strategies at similar rates when compared with those who do not. When holding demographic characteristics constant, utilization of most burn prevention strategies is not protective of sustaining burn injury. Those with lower levels of education and income remain more susceptible to burn injury.
Prevalence and correlates of fire-setting in the United States: results from the National Epidemiological Survey on Alcohol and Related Conditions	Fire-setting was significantly associated with a wide range of antisocial behaviors. Multivariate logistic regression analyses identified strong associations between lifetime alcohol and marijuana use disorders, conduct disorder, antisocial and oobsessive-compulsive personality disorders, and family history of antisocial behavior. Intentional illicit fire-setting behavior is associated with a broad array of antisocial behaviors and psychiatric comorbidities.
Prevention of 3 “Never Events” in the Operating Room: Fires, Gossypiboma, and Wrong-Site Surgery	This study provides the epidemiology, common etiologies, and evidence-based preventative recommendations for each.
Putting public health evidence into practice: increasing the prevalence of working smoke alarms in disadvantaged inner city housing	This study identified some of the reasons for the low level of functioning smoke alarms, and problems experienced with alarms. The main barrier to smoke alarm use was the distress caused by false alarms. Although trial participants considered themselves to be at high risk for fires and would recommend smoke alarms to others, respondents’ reports on the distress caused by false alarms suggest that people balance immediate and longer term risks to their health and wellbeing when they disable alarms.
Randomized controlled trial of ionization and photoelectric smoke alarm functionality	Randomized controlled trial of 761 households. An ionization or photoelectric smoke alarm was installed between June 1, 2000 and July 31, 2002. Main outcome measures were: percentage of study alarms that were working, observed reasons for non-functional status, and self-reported frequency of nuisance alarms at 9 and 15 months of follow-up. Results suggest that the selective use of photoelectric alarms by fire injury prevention programs or consumers may provide longerterm protection in similar populations. Designing smoke alarms that minimize nuisance alarming may also result in longer term functionality.
Reducing the number of deaths and injuries from residential fires	This statement reviews important prevention messages and intervention strategies related to residential fires. Also includes recommendations for pediatricians regarding office anticipatory guidance, work in the community and support of regulation and legislation.
Residential fire related deaths	aim of the study was to describe the epidemiology of residential fire related

and injuries among children: fireplay, smoke alarms, and prevention	deaths and injuries among children, and identify risk factors for these injuries through a linked dataset for the city of Dallas, Texas. Residential fire related injuries among children in Dallas occurred predominantly in the youngest ages (<5 years) and in poor neighborhoods. Most of the deaths, especially those in apartments and mobile homes, resulted from fire play. Smoke alarms appeared to offer no protection against death or injury in fireplay associated fires, possibly from the nature of the child's behavior in these fires, or from the placement of the smoke alarm.
Retail availability of fire-starting materials and their misuse by children and adolescents	This brief research report describes the costs and consequences of the misuse of retail-obtained ignition materials by children and youth. This study shows that almost a fifth (18%) of children and adolescents referred to a specialized juvenile fire-starting program had used ignition materials that they obtained from retail outlets in their fire- starting.
Message 5: "Know the dangers of fire"	This paper aims: (a) to describe the magnitude and the socio-economic burden of fire related injuries in the countries of the EU, (b) to outline underlying risk factors and (c) to present evidence based preventive practices that reduce the likelihood of injury due to fire. Some of these measures are therefore included in the European Code Against Injuries (ECAI) aiming to raise public awareness regarding injury prevention.
Risk Factors for Fires and Burns in Homebound, Urban Elderly	A home safety assessment was performed on 83 patients enrolled in a physician home visiting program. Information was collected on the presence and functioning of smoke alarms, the presence of fire extinguishers and the maximum temperature of hot tap water. Functional smoke alarms were not present in 37% of households, 82% of households had no access to a fire extinguisher, 46% of households had hot tap water temperature greater than the recommended 120°F. Multiple risk factors for burns and fires exist in the homes of elderly homebound patients that are well known to the medical community.
Scald Burns in Young Children—A Review of Arizona Burn Center Pediatric Patients and a Proposal for Prevention in the Hispanic Community	Main etiologies of scald burns included hot water (25%), soup (24%), and coffee or tea (21%). Most common child behaviors were pulling hot substance from stove (24%), from countertop (13%), and having liquid spilled on them (13%) typically while caregiver was cooking. Mean TBSA was 8% with mean length of stay (8 days). Scalds occurred in the kitchen (83%) and mainly in child's home (94%). Mother was primary caregiver (78%). Only 36% of parents spoke Spanish as their primary language. Scalds (43%) usually occurred during year's first quarter ($P < .001$). Focus group participants (85%) reported receiving no prior burn prevention education and preferred to receive prevention instruction in small groups through established community agencies.
Severe Burn Injuries Caused by Bioethanol-Design Fireplaces—An Overview on Recreational Fire Threats	A Medline literature search on barbeque and domestic fireplace accidents was performed to compare and stratify the injury patterns reported and to identify a risk profile for contemporary bioethanol-fueled fireplaces. To exemplify, two representative clinical cases of severe burn accidents caused by bioethanol-fueled fireplaces, both treated in the burn unit of the authors, are being presented. Design fireplaces are being recognized as an increasing source of fuel and fire-related danger in the home.
Socioeconomic deprivation and fatal unintentional domestic fire incidents in New Zealand 1993–1998	A cross-sectional study was undertaken in Aotearoa New Zealand to investigate the relationship between socioeconomic deprivation and risk of an unintentional fatal domestic fire incident. Fatal unintentional domestic fire incidents occurred disproportionately in dwellings in the most socioeconomically deprived meshblocks.

	Strategies to prevent fire related deaths must overcome barriers to household fire safety in population groups experiencing increased risk, including the socioeconomically deprived, seniors, and ethnic minorities. Specific intervention strategies relevant to risks associated with socioeconomic deprivation include improving quality and affordability of housing; increasing prevalence of installed and functioning smoke detectors; and regulation of specific characteristics of cigarettes to reduce risk of ignition from abandoned heat sources.
Spatial and temporal analyses of structural fire incidents and their causes: A case of Toronto, Canada	to gather and analyze data on various causes of fires in order to determine the extent to which existing data can be used as a baseline to improve fire prevention and response activities at local levels. This research uses spatiotemporal techniques to illustrate how the patterns of structural fire incidents in Toronto vary with the time of the day, the day of the week, and the month of the year.
The Effect of Socioeconomic Factors on Fire in China	Research on the relationship between socioeconomic factors and fire in China is presented. Socioeconomic factors have a notable influence on fire, the degree of correlation between them is different from that in other countries.
The epidemiology of burns in a medical center in the Caribbean	retrospective study on burns patients during the 11-year period from the years 1992 to 2002. Data were collected on incidence, gender, age, cause, total body surface area (TBSA) burned, degree, localization, case fatality, length of hospital stay (LOS), and seasonal variation. N= 336; mean age 24.3 years. Most burned patients in the age group 0 to 4 years old (29.2%). We conclude that the incidence, age and gender distribution, LOS and TBSA of burns on Curacao were very similar to data from other international studies from the US, Europe and Asia. Scald and fire were the major causes of burns, being preventable injuries.
The fire situation and progress in fire safety science and technology in China	Description of situation in China; number of fire casualties has come down significantly since the 1980s while fire incidents with high casualties has occurred occasionally; in recent years, the fire situation in China has become relatively stable and an effective strength in fire research has been established.
The impact of recent legislation on paediatric fireworks injuries in the Newcastle upon Tyne region	Reviewed 54 firework-injured children over the last 10 years and assessed the impact of the two recent UK law changes. - legislation has had an impact, but stricter enforcement of the existing laws and further education of children and the general public into the dangers of fireworks is needed, as children are still being injured.
the impact of school fires a study of the wider economic and social impacts on schools and the local community	No article
The interaction between design and occupier behaviour in the safety of new homes	This study examined the interaction between user activity and dwelling design and how this might affect health and safety; aimed to identify how people use features within new homes and how this may limit the protection afforded by building design, codes and regulations. 40 interviews and home inspections. A range of behaviours were reported in relation to building features including fire doors, pipes and cables, and loft access, which may lead to increased risk of injury or ill-health.
The strategies of fire prevention on residential fire in Taipei	Records from Taipei City Fire Department show that age, gender, housing type, the location of the fire, source of ignition, hour range and residential fire deaths are all related to how and why residential fires occurred.

	With aids of the prevention strategy on residential fire a hierarchy of prevention strategy to reduce the probability of residential fires and injury and deaths is build.
Thermische Verletzungen im Kindes- und Jugendalter	german
Using Probabilistic Linkage of Multiple Databases to Describe Burn Injuries in Utah	to identify and describe all burns requiring acute medical care in Utah to define burn prevention and care issues within the state. 5-year study period= 24,934 burns. (61% men; 39%women). 1/3 of burns= younger than 18; majority of injuries treated in the emergency department.
Victims and Survivors in Fatal Residential Building Fires	Personal & behavioral characteristics of victims & survivors of fires (where the cause was either not deliberate or remained undetermined) are examined N=150. Most victims evidenced known risk characteristics (very old or very young, being asleep or being affected by alcohol). Young & old victims more likely to be awake and involved with the fire start.

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7.4. Wildfire / Forestfire

In dit categorie gaat het vooral om bosbranden. Deze studies hadden meestal het doel methoden te testen om zulke branden voortijdig te kunnen voorspellen en detecteren.

Titel	Waar gaat het om?
A decision support system for managing forest fire casualties	Presents the results of scientific research aiming to the development of a DSS for managing forest fires. The system provides a series of software tools for the assessment of the propagation and combating of forest fires based on Arc/Info, ArcView, Arc Spatial Analyst, Arc Avenue, and Visual C++ technologies.
A model for wildfire prevention planning in game resources	This paper proposes a model for evaluating the socio-economic effects of forest fires on hunting.
A Wildland-Urban Interface Typology for Forest Fire Risk Management in Mediterranean Areas	developed a methodological approach in order to assess the hazard and vulnerability of WUI which is based on landscape analysis, on the use of Geographic Information Systems (GIS) techniques and remote sensing.
Adaptive Policy Design for the Management of Wildfire Hazards	An effective policy strategy to counteract the threat of wildfire disasters would entail the reduction of accumulated fuels (flammable organic materials) found across large areas in many American ecosystems. Major uncertainties surround this policy endeavor because fuel reduction has never been attempted on such large scales before. This study outlines an adaptive policy strategy designed to resolve these uncertainties through a systematic process of learning.
Adjacency Externalities and Forest Fire Prevention	This paper models landowner behavior on timberland subject to damage by fire. We examine how management decisions by adjacent landowners yield outcomes that diverge from the social optimum, and consider how this divergence depends on landowner preferences of information. We conduct a numerical simulation in which landowners internet through the effects of their fire prevention activities on a common risk of fire.
Animals as Mobile Biological Sensors for Forest Fire Detection	The devices used in this system are animals which are native animals living in forests, sensors (thermo and radiation sensors with GPS features) that measure the temperature and transmit the location of the MBS, access points for wireless communication and a central computer system which classifies of animal actions.
Antecedents of intention to help mitigate wildfire: Implications for campaigns promoting wildfire mitigation to the general public in the wildland–urban interface	Antecedents from the theory of planned behavior were employed to enhance our understanding of the relationships among wildfire knowledge, attitudes, subjective norms, perceived behavioral control, and intention to help mitigate wildfire in the WUI. Participants (N = 408) living in the WUI in Appalachian Ohio were sampled as a means of conducting formative research prior to developing messages promoting wildfire mitigation. Results reveal that, among the variables in the theory of planned behavior, the only paths that consistently explain individual's intention to help mitigate wildland fire in the WUI in protecting both homes and the environment are associations between knowledge about wildfire and perceived behavioral control and between perceived behavioral control and intention.
Assessing fire risk using Monte Carlo simulations of fire spread	This paper describes and evaluates a novel approach for fire risk assessment that may produce a decision support system for actual fire management at fine scales. FARSITE, a two-dimensional fire growth and behavior model was activated, using ArcView VBA code, to generate Monte Carlo simulations of fire spread. The resulting 500 maps of fire distribution (the entire area burnt in a specific fire) were overlaid to

	produce a map of 'hotspots' and 'cold spots' of fire frequency.
Bushfire management: why, where and how economics matter?	The uncertainty of the potential damage from unmanaged fire events and the impact of infrequent and massive fire events on regional economies are some of the challenges for analysts attempting to introduce economic thinking into fire management decision-making. Economics provides a standard framework for valuing human suffering and other resources affected by bushfires. Impact assessment of major bushfire events on regional economies, and resource allocation for different programs are also areas where economic methodologies can help by better allocation of scare resources.
Changes to simulated fire behaviour and societal benefits after two levels of thinning in a mixed-conifer wildlandurban interface community	Potential fire behaviour and various societal benefits (air pollution removal, carbon sequestration, and stormwater runoff) were quantified in a California Sierra mixed-conifer forest in (a) untreated conditions, (b) after removing all understorey trees <15 cm dbh, and (c) after thinning 50% of the stand's total basal area. Potential fire behaviour was modelled under constant conditions near a hypothetical development by the FARSITE fire behaviour and growth simulator and societal benefits were calculated by CITYgreen, both GIS-based software applications. Results showed that fire behaviour was considerably moderated by both thinning treatments.
Characterization and mapping of dwelling types for forest fire prevention	Both the hazard (probability of fire outbreak, distribution) and the vulnerability of urban areas can be characterized through the spatial organization of houses and vegetation. The first step required is to characterize and map WUI in large areas and at a large scale, which, in turn requires qualifying different types of dwellings and mapping them. With this goal in view, the paper presents a brief synthesis of results coming from an exploratory process for the characterization of dwelling types
Community fire safety at the urban/rural interface: The bushfire risk	A survey of residents in the urban/rural interface was undertaken to examine issues of fire safety including bushfire risk, bushfire knowledge, fire prevention, communication and education. A significant proportion (p(0.05) of surveyed residents (52%) living in the urban/rural interface acknowledged that they live in a very high fire risk area. Surveyed residents that were new to the area or had a lower fire-related knowledge perceived bushfires to be a lower threat. Fire prevention by residents was significantly lower (p(0.05) for nonproperty owners than property owners. There was also a perception by more than half of the respondents that fire authorities would protect individual homes during a bushfire.
Community safety programs for bushfire: What do they achieve, and how?	summary of the findings from a review of available evaluative studies of community education, awareness and engagement (EAE) activities and programs for bushfire in Australia. Also identified four broad causal processes that appear to be critical for the generation of the desired community safety outcomes (risk awareness and knowledge of fire behaviour and safety measures, household and community level planning, physical and psychological preparation for a bushfire, and a safe response if and when a fire occurs). These causal processes are: Engagement, Trust and Selfconfidence, Confirmation and Re-assessment, and Community Involvement and Collaboration.
Driving Factors for Forest Fire Occurrence in Durango State of Mexico: A Geospatial	The objective of this study is to identify variables that are spatially related to the occurrence and incidence of the forest fire in the State of Durango, Mexico. For this purpose, data from forest fire records for a five-year

Perspective	period were analyzed. The spatial correlations between forest fire occurrence and intensity of land use, susceptibility of vegetation, temperature, precipitation and slope were tested by Geographically Weighted Regression (GWR) method, under an Ordinary Least Square estimator. Results show that the spatial pattern of the forest fire in the study area is closely correlated with the intensity of land use, and land use change is one of the main explanatory variables. In addition, vegetation type and precipitation are also the main driving factors. The fitting model indicates obvious link between the variables. Forest fire was found to be the consequence of a particular combination of the environmental factors, and when these factors coexist with human activities, there is high probability of forest fire occurrence.
Ecological, political and social challenges of prescribed fire restoration in east Texas pineywoods ecosystems: a case study	The effectiveness of prescribed fire restoration of forested sites in three state parks in east Texas, USA was studied. Two sites consisted of mixed shortleaf or loblolly pine and broadleaf overstoreys. The third site was a longleaf pine/little bluestem stand. At two sites, there was a significant increase in the percentage of dead standing saplings in the burn plots from pre- to post-burn. Park visitors' attitudes concerning fire were also examined, indicating a need for education concerning differences between wildfire and prescribed fire, and benefits of prescribed fire.
Economic optimisation of wildfire intervention activities	We describe how two important tools of wildfire management, wildfire prevention education and prescribed fire for fuels management, can be coordinated to minimise the combination of management costs and expected societal losses resulting from wildland fire. We find that although wildfire prevention education and prescribed fire have different effects on timing and types of fires, the optimal solution is to increase both interventions. Prescribed fire affects whole landscapes and therefore reduces losses from all wildfire types (including lightning), whereas wildfire prevention education reduces only human-caused ignitions. Only when used together in a coordinated effort do we find the costs and losses from unintentional wildfires are minimised.
Effects of fuel treatments on fire severity in an area of wildland–urban interface, Angora Fire, Lake Tahoe Basin, California	Unlike most studies of fuel treatment effectiveness, our study design included replication and implicitly controlled for variation in topography and weather. Our results show that fuel treatments generally performed as designed and substantially changed fire behavior and subsequent fire effects to forest vegetation.
Estimating the consequences of wildfire for wildfire risk assessment, a case study in the southern Gulf Islands, British Columbia, Canada	In this paper, we use the preferences of representatives of local fire management agencies as the common consequences metric and apply it to a case study in the southern Gulf Islands, British Columbia, Canada.
Fire hazard after prescribed burning in a gorse shrubland: Implications for fuel management	experimental tests were performed with two fuel complexes (fine ground fuels and regenerated shrubs) resulting from previous prescribed burnings conducted in a gorse shrubland, one, three and five years earlier. The present results suggest that prescribed burning is a very effective technique to reduce fire hazard in the study area, but that fire hazard will be significantly increased by the third year after burning.
Wildfires, Communities, and Agencies: Stakeholders' Perceptions of Postfire Forest Restoration and Rehabilitation	this research investigates the community—US Forest Service agency relations in the postwildfire period in three western US communities. In each community, we interviewed key informant representatives from government, business, environmental organizations, and recreation

	groups and conducted focus groups to gather input from residents located near burn areas. The goal was to understand how forest restoration and rehabilitation efforts and agency outreach were perceived by stakeholders who were recently affected by wildfire and how these perceptions were related to underlying community and fire conditions. Our findings suggest that four vectors interact to determine the level of expectations and need for agency—community engagement in the postfire period: (1) the extent and characteristics of the fire; (2) community economic, recreational, and emotional connection to the forest; (3) the history of agency—community relations; and (4) the level of volunteerism in the community. We provide a schematic of different types of collaboration relevant to the posture period in which, generally, residents preferred action-oriented collaboration, while other agency personnel were more amenable to collaborative planning. On-the ground volunteer restoration activities helped restore community spirit and improve agency—community relations, and increased education and outreach were desirable. The model developed in this research argues for agency responses that consider both the social and the ecological communities when planning postfire restoration projects.
Homeowner Perspectives on Fire Hazard, Responsibility, and Management Strategies at the Wildland-Urban Interface	Focus-group data were analyzed using a framework based on behavioral economics and psychometric models of risk. Attributes associated with the fire risk help explain the relative popularity of different fire protection strategies. Because participants consider forest fires inherently uncontrollable, and the resulting damage essentially random, they are only weakly supportive of investments in firefighting infrastructure, unlikely to take all possible steps to safeguard their own properties, and resolute in their emphasis on solutions that reduce the number of fire ignitions.
Human Factors of Fire Occurrence in the Mediterranean	Arson & motives behind it. The unknown cause is still too frequent in many wildfire statistics. A promising technique to overcome this shortcoming is the Delphi technique which uses a panel of carefully selected experts to improve the knowledge on fire motivations in a specific area. Understanding more about why people start fires would help to reduce the impacts of deliberate fire lighting.
Human-caused wildfire risk rating for prevention planning in Spain	This paper identifies human factors associated with high forest fire risk in Spain and analyses the spatial distribution of fire occurrence in the country. Authors present a model that can be considered a good predictor of human-caused fire risk, aiding spatial decisions related to prevention planning in Spanish municipalities.
Identifying wildland fire ignition factors through sensitivity analysis of a neural network	Data of natural phenomena usually exhibit significantly unpredictable non-linearity, but the robust behavior of a neural network makes it perfectly adaptable to environmental models such as a wildland fire danger rating system. These systems have been adopted by many developed countries that have invested in wildland fire prevention, and thus civil protection agencies are able to identify areas with high probabilities of fire ignition and resort to necessary actions.
Implementation of wildfire risk management by local governments in Alberta, Canada	examined the implementation of wildfire mitigation by local governments in Alberta, Canada. Written surveys and telephone interviews with participants in 18 municipalities were combined with additional in-person interviews within two of these municipalities. Many participating local governments were completing emergency preparedness plans, infrastructure measures,

	education, wildfire hazard assessments on public and private land, and vegetation management. Few were implementing land-use planning and structural mitigation measures on local government buildings. Factors that influenced implementation of wildfire mitigation measures included issue advocates, communication with internal and external stakeholders, financial and human resources, support from higher levels of government, and biophysical and demographic characteristics.
Integrating fire risk considerations in landscape-level forest planning	Simultaneously maximized timber income and the overall fire resistance of the landscape to generate management plans for a typical forest landscape in the Pre-Pyrenees of Catalonia (North-East Spain). The risk of fire was integrated into the economic objective by incorporating potential fire losses in the expected net income. Landscape metrics describing fire resistance were also included in problem formulations. The results show that this approach greatly improves management efficiency in terms of economic profitability and fire resistance.
Integration of Lightning- and Human-Caused Wildfire Occurrence Models	We present two methods for the integration of lightning and human fire occurrence probability models at 1 × 1 km grid cell resolution in two regions of Spain: Madrid, which presents a high fire incidence due to human activities; and Arag´on, one of the most affected regions in Spain by lightning-fires.
Integration of socio-economic and environmental variables for modelling long-term fire danger in Southern Europe	Objective of this study is to model large scale structural forest fire danger in Southern Europe. Due to the different availability of input data, two different fire danger models were built. Given the structural condition of the variables considered, the resulting models can be used to support the design of fire prevention policies on the long-term basis.
Integrative Complexity of Public Beliefs Toward Wildfire Management: Development of a Scale	This paper presents the process by which a combination open-ended and fixed-item scale was developed to measure the complexity of thought that is consistent with integrative complexity. We used the controversial issue of wildfire management in developing the scale because it has become a pervasive natural resource concern that has divided the public's perceptions regarding its management. The resulting scale is designed for use in large surveys across any number of natural resource issues.
Landowner perception, awareness, and adoption of wildfire programs in the southern united states	The goal of this research was to determine overall landowner awareness regarding wildfire programs and education and identify interrelationships among management strategies, demographic variables, and experiences.
Local-Scale Fuel-Type Mapping and Fire Behavior Prediction by Employing High-Resolution Satellite Imagery	to present an integrated approach to forest fire management, combining local-scale fuel-type mapping from very high spatial resolution imagery with fire behavior simulation. The specific objectives were i) to develop a detail site-specific fuel model in a Mediterranean area that is suitable for fire behavior prediction; ii) to produce a detailed local-scale fuel-type map with an object-based approach; and iii) to generate accurate fire behavior maps.
Mapping lightning/human-caused wildfires occurrence under ignition point location uncertainty	Lightning/ human caused fires occurrence was investigated in the region of Arag ´ on's autonomy over 19 years (1983–2001) using 3428 and 4195 ignition points respectively for the two causes of fire origin. The proposed technique should be promising to support decision-making in wildfire prevention actions, because of the occurrence map can be used as a response variable in fire risk predicting models.
Mapping wildland-urban interfaces at large scales	This paper presents a method to characterize and map WUIs at large scales and over large areas for wildland fire prevention in the South of

integrating housing density and vegetation aggregation for fire prevention in the South of France	France. Based on the combination of four types of building configuration and three classes of vegetation structure, 12 interface types were classified. Through spatial analysis, fire ignition density and burned area ratio were linked with the different types of WUI. Among WUI types, isolated WUIs with the lowest housing density represent the highest level of fire risk.
Net Benefits of Wildfire Prevention Education Efforts	model indicated that wildfire prevention education efforts have statistically significant and negative effects on the numbers of wildfires ignited by debris burning, campfire escapes, smoking, and children. Evaluating the expected reductions in wildfire damages given a change in wildfire prevention education efforts from current levels showed that marginal benefits exceed marginal costs statewide by an average of 35-fold.
Optimal spatial patterns of fuel management and timber harvest with fire risk	We combine a physical fire model and a spatial-dynamic optimization model to explore harvest and fuel treatment across a hypothetical landscape under risk of a moving fire over a range of physical and economic conditions.
Perceived and actual wildfire danger: An economic and spatial analysis study in Colorado (USA)	Requiring wildland urban interface residents to pay an annual tax for their wildfire risk could lower costs to the general taxpayer. Willingness-to-pay for wildfire prevention, in relation to both perceived and actual wildfire danger, was the focus of this study. Surveyed Colorado wildland urban interface residents were found to have a high awareness of wildfire risk and were willing-to-pay over $400 annually to reduce this risk.
Predicting forest fire in the Brazilian Amazon using MODIS imagery and artificial neural networks	The presented work describes a methodology that employs artificial neural networks (ANN) and multitemporal imagery from the MODIS/Terra-Aqua sensors to detect areas of high risk of forest fire in the Brazilian Amazon. A histogram analysis showed that the spatial distribution of the areas with fire risk were consistent with the fire events observed from June to December 2005. The ANN model allowed a fast and relatively precise method to predict forest fire events in the studied area.
Prescribed burning in catalonia: fire management and research	The most relevant achievements in prescribed burning during its six years of application will be presented in this paper
Prescribed Burning in State Park Properties of North Carolina and Nearby Coastal States	Anecdotes about prescribed burning in Carolina.
Prescribed fire and conservation of a threatened mountain grassland specialist: a capture–recapture study on the Orsini's viper in the French alps	We studied the impact of a prescribed fire on the survival and small-scale movements of one of the rarest snakes in Europe, the Orsini's viper Vipera ursinii, in order to evaluate its potential threat to population sustainability.
Public Response to Wildfire: Is the Australian "Stay and Defend or Leave Early" Approach an Option for Wildfire Management in the United States?	This article examines the Australian "stay and defend or leave early" approach and the contextual factors that may make it more or less appropriate in the United States. We first discuss what it actually entails and then examine four contextual areas that could influence how appropriate the approach might be in the United States: nature of fire risk, agency roles and responsibilities, education and shared responsibility, and human dimensions and decisionmaking.
Respiratory Irritants in Australian Bushfire Smoke: Air Toxics Sampling in a Smoke Chamber and During Prescribed Burns	Despite the high frequency of bushfires in Australia, analyses of bushfire smoke components are scarce. As part of an occupational health study investigating the respiratory health effects of bushfire smoke in firefighters, air toxics sampling was undertaken in a smoke chamber and during prescribed burns. Levels of formaldehyde and acrolein were

	demonstrated at respectively 60% and 80% of the Short Term Exposure Limit in the smoke chamber. Carbon monoxide levels exceeded the peak limit of 400 ppm significantly. Although concentrations were lower during the prescribed burns, the study shows that Australian bushfire smoke contains air toxics of concern.
Spatial modelling of socioeconomic data to understand patterns of human-caused wildfire ignition risk in the SW of Madrid (central Spain)	In this paper, different approaches to spatially model data to examine the influence of human activity on wildfire ignition in the south west of the Madrid region are used; the utility of choropleth and dasymetric mapping with both Euclidean and functional distance surfaces for two differently defined wildfire seasons are examined. - Results indicate that spatial patterns of wildfire ignition are strongly associated with human access to the natural landscape.
SRM Center for Professional Education and Development: Wildfires and Invasive Plants in American Deserts	Conference paper on wildfires.
Testing transferability of willingness to pay for forest fire prevention among three states of California, Florida and Montana	The equivalency of willingness to pay between the states of California, Florida and Montana is tested.
The 2007 Southern California Wildfires: Lessons in Complexity	Uses the 2007 fires as a case study to draw three major lessons about wildfires and wildfire complexity in southern California. - the most important advances in fire safety in this region are to come from advances in fire prevention, fire preparedness, and land-use planning that includes fire hazard patterns.
The effects of wildfire and environmental amenities on property values in northwest Montana, USA	This study employed the hedonic price framework to examine the effects of 256 wildfires and environmental amenities on home values in northwest Montana between June 1996 and January 2007. - homebuyers may correlate proximity to and view of a wildfire burned area with increased wildfire risk.
The present status of fire ecology, traditional use of fire, and fire management in mexico and central america	Description on forest fires in Mexico, the Caribe, and Central America. Traditionally= destructive phenomena Now= “integral fire management” (the fusion of firefighting and prevention with the ecological use of fire and community fire management in order to preserve nature and to make the land productive).
The role of community policies in defensible space compliance	qualitative study; focus group interviews with homeowners in 3 diverse communities and used the theory of reasoned action to interpret dimensions of local-level wild-land fire policies that are associated with homeowner acceptance of or compliance with defensible space guidelines or regulations. - findings led to a proposed conceptual model of vegetation management policy acceptance and compliance that local governments can use to develop or amend defensible space vegetation management policies to increase policy acceptance and compliance.
Two-year evaluation of fuelbreaks grazed by livestock in the wildfire prevention program in Andalusia (Spain)	a streamlined monitoring system is proposed to evaluate grazing in fuelbreaks. Regarding fuelbreak characteristics, larger shrub volumes were found to negatively affect the accomplishment of grazing objectives.
Urban residents’ approval of management measures to	Survey of homeowner´s N=436. This paper presents respondents’ approval of five interface fire

mitigate wildland–urban interface fire risks in Edmonton, Canada	management measures. Education was most popular, and both thinning of vegetation within the river valley and restricting where people can build their homes received considerable support. Over half of respondents supported a requirement for residents to remove flammable vegetation close to their homes. Prescribed burning was the least popular measure. Edmonton survey respondents were more supportive of zoning and mandatory vegetation removal than has been found in previous studies in the US. Those measures that impacted residents the least were more likely to be supported. Factors influencing support for management measures, including risk perceptions, experiences, tenure and formal education, are discussed. Recommendations are made for natural area managers and land use planners.
Video Based Wild Fire Detection at Night	A novel method explicitly developed for video based detection of wildfires at night (in the dark) is presented, comprising 4 sub-algorithms: (i) slow moving video object detection, (ii) bright region detection, (iii) detection of objects exhibiting periodic motion, and (iv) a sub-algorithm interpreting the motion of moving regions in video. Individual decisions of the sub-algorithms are combined together using a least-mean-square(LMS) based decision fusion approach, and fire/nofire decision is reached by an active learning method.
What Influences Hazard Mitigation? Household Decision Making About Wildfire Risks in Arizona's White Mountains	-> social vulnerability, place dependency, and contextual influences are important determinants of mitigation of wildfire hazards. Lower income & renter households engage in less mitigation than higher income and homeowner households. -> wildfire protection programs(traditionally focused on public education) must be expanded to increase levels of household hazard mitigation.
Wildfire detection using lms based active learning	A computer vision based algorithm for wildfire detection is developed.
Wildfire policy and use of science in the context of a socio-ecological system on the Aegean Archipelago	- Summarizes the results of a socio- ecological study on Greek islands to characterize fire science and policy at regional and local levels, and perceptions of fire risk. -> significant lack of financial support and resources exist to support prevention which is relatively inadequate; public participation in fire prevention remains limited.
Wildfire Research in an Environmental Hazards Course: An Active Learning Approach	Project to implement learning strategies to encourage students to be active in wildfire hazards research. The student-based evaluation of the project and its outcomes highlights the ways in which this approach can increase understanding of local hazard scenarios, familiarity with relevant theory, geographical knowledge, and skills in research.
Wildland forest fire smoke: health effects and intervention evaluation, Hoopa, California, 1999	- assess the health effects of exposure to smoke from wildfire; observational study, review of medical records,survey interviews N=289. During the weeks of the forest fire, medical visits for respiratory illnesses increased by 52%.

7.4.1. References

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7.5. Literature Reviews

Hier gaat het om samenvattingen van bestaande wetenschappelijke studies. Ze vatten samen wat er zo allemaal belangrijk is tijdens het preventief werken met verschillende doelgroepen, zoals ouderen of mensen met handicap. Verder is hier onder andere ook een brandmelder studie te vinden die tracht een antwoord te kunnen geven op de vraag, welke geluiden nu het effectiefst zijn in het wakker maken van mensen.

A review of research on procedures for teaching safety skills to persons with developmental disabilities	Reviewed the literature on teaching safety skills to persons with DD. The studies reviewed have varying degrees of success and demonstrate varying degrees of generalization, but the general finding has been that prompting, reinforcement, and role-playing are effective teaching procedures across a variety of participants, skills, and settings.
A systematic review of accidental injury from fire, wandering and medication self-administration errors for older adults with and without dementia	Purpose of this systematic review is to determine the frequency of injury for persons with dementia and the general older adult population, from three sources: fires/burns, medication self-administration errors and wandering.
Burn prevention mechanisms and outcomes: Pitfalls, failures and successes	The present review is a summary of what has already been accomplished in terms of burn prevention highlighting some of the successes but above all the numerous pitfalls and failures. Recognizing these failures is the first step towards development of more effective burn prevention strategies particularly in LMICs in which burn injury remains endemic and associated with a high mortality rate.
Community safety programs for bushfire: What do they achieve, and how?	summary of the findings from a review of available evaluative studies of community education, awareness and engagement (EAE) activities and programs for bushfire in Australia. Also identified four broad causal processes that appear to be critical for the generation of the desired community safety outcomes (risk awareness and knowledge of fire behaviour and safety measures, household and community level planning, physical and psychological preparation for a bushfire, and a safe response if and when a fire occurs). These causal processes are: Engagement, Trust and Selfconfidence, Confirmation and Re-assessment, and Community Involvement and Collaboration.
Epidemiology of burn injuries II: Psychiatric and behavioural perspectives	Reviews the evidence of psychiatric and behavioural risk factors and prevention opportunities for burn injuries worldwide. Psychiatric prevalence rates and risk factors for burn injuries, prevalence and risks associated with 'intentional' burn injuries (self-immolation, assault, and child maltreatment), and prevention activities targeting the general population and those with known psychiatric and behavioural risk factors are discussed.
Evaluated community fire safety interventions in the united states: a review of current literature	Assess the state of fire prevention research, provide an updated synthesis of evaluated fire prevention programs, and discuss the role of fire fighters and data systems in prevention efforts. We identified twelve articles: seven reported on smoke alarm interventions, three on multi-faceted programs, and two other programs. Five programs involved fire service personnel in the design, implementation, and/or evaluation, and three used existing data systems. Studies reviewed suggest that canvassing and smoke alarm installations are the most effective means of distributing alarms and increasing the functional status of distributed alarms. The functionality of smoke alarms,

	an issue noted in earlier reviews, remains a problem. Programs involving partnerships with fire departments have indicated success in preventing fires and deaths, improving smoke alarm ownership and functional status, and improving children's fire safety knowledge.
Interventions to Prevent Residential Fire Injury	Review of Literature
Interventions with arsonists and young fire setters: A survey of the national picture in England and Wales	A national survey was conducted of organizations delivering interventions to arsonists and young fire setters. The survey was followed by site visits to eight organizations to conduct interviews with relevant staff. The site visits and interviews revealed areas of good practice across the organizations visited, and highlighted areas where developments might be made to improve services.
Optimizing Emergency Awakening to Audible Smoke Alarms An Update	This review examines research on arousal from sleep in an emergency. It considers whether the current smoke alarm signal is optimal for waking those most at risk of dying in a fire and, if not, how it may be improved. Significant risk factors for staying asleep include high levels of background noise, being a heavy sleeper, sleep deprivation, being a child, hypnotics, alcohol intoxication, and hearing impairment. The high frequency beeping signal was significantly less effective than either a voice alarm or mixed-frequency beeping in waking selected at-risk groups.
Preventive Care in the Emergency Department: A Systematic Literature Review on Emergency Department-based Interventions that Address Smoke Detectors in the Home	Trying to make a review of literature. Four of the six studies met the inclusion criteria. One other study that did not meet the inclusion criteria was also considered. No study focused specifically on the counseling of ED patients about smoke detectors.
Reducing the number of deaths and injuries from residential fires	This statement reviews important prevention messages and intervention strategies related to residential fires. Also includes recommendations for pediatricians regarding office anticipatory guidance, work in the community and support of regulation and legislation.
Message 5: "Know the dangers of fire"	This paper aims: (a) to describe the magnitude and the socio-economic burden of fire related injuries in the countries of the EU, (b) to outline underlying risk factors and (c) to present evidence based preventive practices that reduce the likelihood of injury due to fire. Some of these measures are therefore included in the European Code Against Injuries (ECAI) aiming to raise public awareness regarding injury prevention.
Social and economic factors associated with the risk of burn injury	The purpose of this literature synthesis was to determine: (1) which SES factors have been associated with burn risk; (2) whether these factors are generalizable across studies; and (3) which of these factors are modifiable. The lack of standard definitions for SES, as well as the heterogeneity of study populations and outcome variables, limits the generalizability of these results. However, the results confirm that several SES factors are associated with increased risk of burn.
Systematic review of controlled trials of interventions to promote smoke alarms	To evaluate the effects of promotion of residential smoke alarms. A total of 26 trials were identified, of which 13 were randomised. - Counselling as part of child health surveillance may increase smoke alarm ownership and function, but its effects on injuries are unevaluated. Community smoke alarm give away programmes apparently reduce fire related injuries, but these trials were not randomized and results must be interpreted cautiously.
The impact of recent legislation	Reviewed 54 firework-injured children over the last 10 years and assessed

on paediatric fireworks injuries in the Newcastle upon Tyne region	the impact of the two recent UK law changes. - legislation has had an impact, but stricter enforcement of the existing laws and further education of children and the general public into the dangers of fireworks is needed, as children are still being injured.
Thirty Year Review of Safety Skill Instruction for Persons with Intellectual Disabilities	Synthesizes the empirical literature (1976–2006) focusing on teaching personal safety skills to persons with intellectual disabilities. 36 investigations identified providing information on six areas: (a) pedestrian/street crossing safety; (b) home accident prevention; (c) application of first aid; (d) response to lures or advancements of strangers; (e) fire safety; and (f) emergency use of telephones.

7.5.1. References

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7.6. Risk Perception

Hier gaat het om studies die de risico perceptie van mensen analyseren.

Title	Waar gaat het om?
Alcohol's Contribution to Fatal Injuries: A Report on Public Perceptions	Respondents' mean estimates of alcohol's involvement in fatal injuries were compared with published data from a metaanalysis of medical examiner data. The study population accurately estimated the proportion of fatal fall, drowning, and poisoning victims who were legally drunk when they died. Respondents overestimated the proportion of drivers killed in motor vehicle crashes who were intoxicated and underestimated the proportion of fire/burn victims.
Community fire safety at the urban/rural interface: The bushfire risk	A survey of residents in the urban/rural interface was undertaken to examine issues of fire safety including bushfire risk, bushfire knowledge, fire prevention, communication and education. A significant proportion of surveyed residents (52%) living in the urban/rural interface acknowledged that they live in a very high fire risk area. Surveyed residents that were new to the area or had a lower fire-related knowledge perceived bushfires to be a lower threat. Fire prevention by residents was significantly lower for nonproperty owners than property owners. There was also a perception by more than half of the respondents that fire authorities would protect individual homes during a bushfire.
Ecological, political and social challenges of prescribed fire restoration in east Texas pineywoods ecosystems: a case study	The effectiveness of prescribed fire restoration of forested sites in three state parks in east Texas, USA was studied. Two sites consisted of mixed shortleaf or loblolly pine and broadleaf overstoreys. The third site was a longleaf pine/little bluestem stand. At two sites, there was a significant increase in the percentage of dead standing saplings in the burn plots from pre- to post-burn. Park visitors' attitudes concerning fire were also examined, indicating a need for education concerning differences between wildfire and prescribed fire, and benefits of prescribed fire.
Fire use and prevention by traditional households in the Brazilian Amazon	We use data from a survey of 220 households to examine fire prevention and the scale of fire prevention and burning activities among traditional subsistence households in the Tapajós National Forest in Pará, Brazil. We find that in traditional households, economic variables such as the opportunity cost of household time, market conditions, and the hiring wage are important predictors of these decisions, as is household reliance on standing forest resources for nontimber products. Our results confirm that traditional households actively engage in fire prevention, and suggest that fire prevention is motivated by a desire to protect agricultural plantations as well as standing forest reserves. The results suggest that increased income, improved infrastructure, and improved access to markets for labor and agricultural goods will encourage fire prevention among smallholders in communities with education and planning programs.
Wildfires, Communities, and Agencies: Stakeholders' Perceptions of Postfire Forest Restoration and Rehabilitation	This research investigates the community—US Forest Service agency relations in the post wildfire period in three western US communities. In each community, we interviewed key informant representatives from government, business, environmental organizations, and recreation groups and conducted focus groups to gather input from

	residents located near burn areas. The goal was to understand how forest restoration and rehabilitation efforts and agency outreach were perceived by stakeholders who were recently affected by wildfire and how these perceptions were related to underlying community and fire conditions. Our findings suggest that four vectors interact to determine the level of expectations and need for agency—community engagement in the postfire period: (1) the extent and characteristics of the fire; (2) community economic, recreational, and emotional connection to the forest; (3) the history of agency—community relations; and (4) the level of volunteerism in the community. We provide a schematic of different types of collaboration relevant to the posture period in which, generally, residents preferred action-oriented collaboration, while other agency personnel were more amenable to collaborative planning. On-the ground volunteer restoration activities helped restore community spirit and improve agency—community relations, and increased education and outreach were desirable. The model developed in this research argues for agency responses that consider both the social and the ecological communities when planning postfire restoration projects.
Effectiveness of Injury Prevention Strategies: What Does the Public Believe?	survey in which adults were asked to name effective strategies for preventing deaths due to motor vehicle crashes, falls, drowning, fires/burns, and poisoning. A majority of the 943 respondents could name prevention techniques, although they were least likely to do so for fatal falls. Participants at highest risk for not naming a countermeasure were those with fewer years of education. The strategy cited most often for preventing deaths due to falls, poisoning, and drowning was safety education. These findings suggest that more advantaged members of the public feel they know how to prevent America's leading causes of injury death. They may not fully appreciate, however, the options of creating health promoting environments and safer products. This work makes it very clear that people with less education also need to be exposed to the breadth of effective injury countermeasures.
Homeowner Perspectives on Fire Hazard, Responsibility, and Management Strategies at the Wildland-Urban Interface	Focus-group data were analyzed using a framework based on behavioral economics and psychometric models of risk. Attributes associated with the fire risk help explain the relative popularity of different fire protection strategies. Because participants consider forest fires inherently uncontrollable, and the resulting damage essentially random, they are only weakly supportive of investments in firefighting infrastructure, unlikely to take all possible steps to safeguard their own properties, and resolute in their emphasis on solutions that reduce the number of fire ignitions.
Implementation of wildfire risk management by local governments in Alberta, Canada	examined the implementation of wildfire mitigation by local governments in Alberta, Canada. Written surveys and telephone interviews with participants in 18 municipalities were combined with additional in-person interviews within two of these municipalities. Many participating local governments were completing emergency preparedness plans, infrastructure measures, education, wildfire hazard assessments on public and private land, and vegetation management. Few were implementing land-use planning and structural mitigation measures on local government buildings. Factors that influenced implementation of wildfire mitigation measures included

	issue advocates, communication with internal and external stakeholders, financial and human resources, support from higher levels of government, and biophysical and demographic characteristics.
Injury prevention activities in U.S. trauma centres: Are we doing enough?	A survey was sent to eligible institutions in the National Inventory of Trauma Centres to better describe how level I and II centres are fulfilling their injury prevention requirement, to identify the barriers to conducting prevention activities, and to determine trauma centre personnel's interest in enhancing their prevention role. Only 19% reported having an injury prevention director/coordinator but more than half of centres reported participating in 9 of 11 injury prevention activities, including participating in community events (97%), sending speakers to local schools (89%), and preparing or distributing educational materials (84%). Lack of time (68%), dedicated funding (68%), and an injury prevention specialist (45%) were the most frequently cited barriers to conducting injury prevention activities. Injury prevention collaborations were reported with safety groups (24%) and with emergency medical services, fire and police (23%). Trauma centres partnered less frequently with academic institutions (11%) and local or state health departments (16%). Topics and formats for injury prevention training as well as training barriers were also explored.
Integrative Complexity of Public Beliefs Toward Wildfire Management: Development of a Scale	This paper presents the process by which a combination open-ended and fixed-item scale was developed to measure the complexity of thought that is consistent with integrative complexity. We used the controversial issue of wildfire management in developing the scale because it has become a pervasive natural resource concern that has divided the public's perceptions regarding its management. The resulting scale is designed for use in large surveys across any number of natural resource issues.
Fire risk management system for safe operation of large atmospheric storage tanks	This paper has been prepared by its authors to show the benefits coming from the application of the fire risk assessment methodology prepared by the ''LastFire_ Project'' group of experts.
Landowner perception, awareness, and adoption of wildfire programs in the southern united states	The goal of this research was to determine overall landowner awareness regarding wildfire programs and education and identify interrelationships among management strategies, demographic variables, and experiences.
Managerial perceptions and the production of fire protection	This article argues that an issue central to the study of local government performance is how public managers perceive their decision-making environments. It examines a key aspect of the relationship between public management and government performance by explicitly incorporating public managers in an economic production framework for public services. A portion of the model developed in the article is applied to the case of fire chiefs as the primary managers of the production of fire protection by local fire departments. The Q factor analysis technique is used to typologize fire chiefs' perceptions of their managerial environments.
Media Exposure and Attention as Mediating Variables Influencing Social Risk Judgments	examined the hypothesis that media exposure and attention partially mediate the effects of variables such as demographics and personal experience on risk judgments. Results supported the hypotheses of partial mediation with respect to most risk judgment factors. In particular, effects of education, gender, sensation seeking, and prior firsthand or secondhand experience with alcohol-related mishaps on

	judgments of concern and/ or severity were partially mediated by media variables.
Newspaper coverage of residential fires: an opportunity for prevention communication	Four daily newspapers circulating widely in Maryland were monitored for 1 year. Articles describing residential fires were coded for measures of prominence, content and frame. Analysis focused on measures of issue newsworthiness, reporting of causation and consequences of fires, and inclusion of public health context and conveyance of prevention messages. Results: The data indicate that fires are newsworthy, with 374 relevant news articles in a 1-year period, 32% of which appear on the first page of a section. Coverage generally concerned recent local fire events. Most articles discussed the consequences of fires (88%), and identified a causal factor (58%). Only 36%, however, included prevention information, and less than one-quarter set residential fires in a public health context.
Perceived and actual wildfire danger: An economic and spatial analysis study in Colorado (USA)	Requiring wildland urban interface residents to pay an annual tax for their wildfire risk could lower costs to the general taxpayer. Willingness-to-pay for wildfire prevention, in relation to both perceived and actual wildfire danger, was the focus of this study. Surveyed Colorado wildland urban interface residents were found to have a high awareness of wildfire risk and were willing-to-pay over $400 annually to reduce this risk.
Perceptions of rural people about childhood burns and their prevention: A basis for developing a childhood burn prevention programme in Bangladesh	Five focus group discussions were conducted in this study. Focus group participants were aware of the devastating consequences of childhood burn injuries. They reported that younger boys and older girls are at higher risk of burn injuries. They identified home as the most common place for childhood burn injuries, and stated that occurrence was more common in winter. They held the household members or caregivers responsible because of their lack of supervision and carelessness. The focus group participants suggested that people should supervise their children more carefully, and should take initiatives to modify their homes and premises as necessary so that children would not have access to fires and heat sources.
Prevention of deaths and injuries caused by house fires survey of local authority smoke alarm policies	Survey of 405 municipalities in England&wales. Over a half of public-sector households within England and Wales are offered smoke alarms by local authorities.
Public beliefs about the preventability of unintentional injury deaths	survey in which 943 adults were queried. Subjects reported the proportion of deaths due to motor vehicle crashes, falls, fires/burns, drowning and poisoning that they felt were preventable. On average, respondents believed that 56% of 'fatal accidents' were preventable; as were 62% of motor vehicle crash deaths, 53% of fall deaths, 67% of drownings, 62% of fire/burn fatalities and 70% of accidental poisonings.
Putting public health evidence into practice: increasing the prevalence of working smoke alarms in disadvantaged inner city housing	This study identified some of the reasons for the low level of functioning smoke alarms, and problems experienced with alarms. The main barrier to smoke alarm use was the distress caused by false alarms. Although trial participants considered themselves to be at high risk for fires and would recommend smoke alarms to others, respondents' reports on the distress caused by false alarms suggest that people balance immediate and longer term risks to their health and wellbeing when they disable alarms.

Respiratory Protection Programs for Firefighters: A Survey of Practices for the State of Kentucky	A survey of Kentucky fire departments was conducted to assess their respiratory protection practices, barriers to program implementation, and medical evaluation programs. This survey indicates that many Kentucky fire departments are not meeting the legal and voluntary respiratory protection standards and guidelines, and demonstrates the need for improved education and funding to ensure that firefighters are adequately protected from respiratory hazards.
Road-tunnel fires: Risk perception and management strategies among users	The present study was aimed at investigating road users' perceptions and behaviors in case of a fire in a tunnel. It is grounded on the idea that in order to effectively prevent accidents and fires in tunnels, it may be useful to take tunnel users' beliefs, representations, and coping strategies into account. One hundred and fifty-one road users (firemen, truck drivers, regular drivers, and driving-school students) filled out a questionnaire measuring their perceptions of risks and control in road tunnels, their awareness of safety and rescue devices, their level of anxiety, and their behavioral intentions in the event of a fire in a road tunnel. The results indicated a relationship between fire-risk perception, awareness of rescue and safety devices, and road-tunnel experience; a tendency toward comparative optimism (CO); an effect of perceived control on optimism; and a relationship between CO and awareness of safety devices. A significant interaction was found between tunnel users' anxiety level and their perceived control over the situation. The evacuation behaviors and coping strategies reported by the participants were far from reflecting the expected behaviors.
Safety preparedness of urban community for New Year fireworks in Tehran	The aim of this study was to determine safety preparedness of inhabitation in Tehran. They asked responders about source of information on how to use firework items and having education of safe use of fireworks. Also people were asked about having first aid kits and fire extinguisher at home. The study included 2475 families. We conclude that Tehranian households were not sufficiently prepared to guarantee a safe festival .
Smokey the Tapir Traditional Fire Knowledge and Fire Prevention Campaigns in Lowland Bolivia	Working with Chiquitano Indians in the southeastern lowlands, we were interested in finding out (1) the level of knowledge of fire behavior and the ecological role of fire in shaping forest and savannah ecosystems, and (2) current attitudes in Lomerio toward fire as a land management tool. We conducted key informant interviews in the Chiquitano territory of Lomerio to document Chiquitano knowledge of and attitudes toward fire practices.
Survey of primary school educators regarding burn-risk behaviors and fire-safety education	To assess primary school educator knowledge and opinions regarding fire-setting behaviors and burn-injury prevention education. Survey to 8 primary schools. 20% of elementary school educators had experience teaching burned children; 8% had experience with children that were injured due to fire-play. Nearly all primary school educators surveyed agreed that burn injuries and attempting to curb fire-play are important societal issues. There was wide agreement that including a description of the medical and social consequences of burns in a preventive curriculum would enhance its efficacy. The younger students are, the more time teachers require to adequately convey fire safety instruction.
The effects of wildfire and environmental amenities on	This study employed the hedonic price framework to examine the effects of 256 wildfires and environmental amenities on home values in

property values in northwest Montana, USA	northwest Montana between June 1996 and January 2007. - homebuyers may correlate proximity to and view of a wildfire burned area with increased wildfire risk.
The interaction between design and occupier behaviour in the safety of new homes	This study examined the interaction between user activity and dwelling design and how this might affect health and safety; aimed to identify how people use features within new homes and how this may limit the protection afforded by building design, codes and regulations. 40 interviews and home inspections. A range of behaviours were reported in relation to building features including fire doors, pipes and cables, and loft access, which may lead to increased risk of injury or ill-health.
The role of community policies in defensible space compliance	qualitative study; focus group interviews with homeowners in 3 diverse communities and used the theory of reasoned action to interpret dimensions of local-level wild-land fire policies that are associated with homeowner acceptance of or compliance with defensible space guidelines or regulations. - findings led to a proposed conceptual model of vegetation management policy acceptance and compliance that local governments can use to develop or amend defensible space vegetation management policies to increase policy acceptance and compliance.
The Role of the Individual – A Key to Learning in Preparedness Organizations	to determine whether individual municipal employees, who have the responsibility for preparedness planning, reason and act in ways that promote learning about crises and preparedness issues throughout the municipal organization. Interviews with Swedish preparedness planners ->preparedness planning too often becomes a demarcated activity, restricted to not more than a handful of individuals.
Urban residents' approval of management measures to mitigate wildland–urban interface fire risks in Edmonton, Canada	Survey of homeowner´s N=436 This paper presents respondents' approval of five interface fire management measures. Education was most popular, and both thinning of vegetation within the river valley and restricting where people can build their homes received considerable support. Over half of respondents supported a requirement for residents to remove flammable vegetation close to their homes. Prescribed burning was the least popular measure. Edmonton survey respondents were more supportive of zoning and mandatory vegetation removal than has been found in previous studies in the US. Those measures that impacted residents the least were more likely to be supported. Factors influencing support for management measures, including risk perceptions, experiences, tenure and formal education, are discussed. Recommendations are made for natural area managers and land use planners.
Using the Theory of Planned Behavior and a Stage Model of Persuasion to Evaluate a Safety Message for Firefighters	examines: (a) the ability of the theory of planned behavior (TPB) to predict behavioral intentions for firefighters receiving an occupational safety and health message & (b) the use of a persuasion output matrix to assess message impact. Message nationally distributed to 36,000 fire chiefs, 781 randomly selected to complete survey assessing message impact and behavioral intentions. --> message impact was weakest at the exposure, recall, and action stages of persuasion output. - TPB variables found to significantly predict safety intentions.

‘‘What do kids know’’: A survey of 420 Grade 5 students in Cambodia on their knowledge of burn prevention and first-aid treatment	to determine the knowledge of burn prevention and first aid for burns in Grade 5 Cambodian school children, as baseline information to design a burn prevention campaign; Survey, N=420 Even though 36% of students indicated they had received information about burn prevention and first aid, only 13% mentioned application of cool water as initial treatment, only 7% knew to roll on the ground if their clothes caught fire, and nearly 50%would pour water on a burning pot of oil.
What Influences Hazard Mitigation? Household Decision Making About Wildfire Risks in Arizona's White Mountains	-> social vulnerability, place dependency, and contextual influences are important determinants of mitigation of wildfire hazards. Lower income & renter households engage in less mitigation than higher income and homeowner households. -> wildfire protection programs(traditionally focused on public education) must be expanded to increase levels of household hazard mitigation.
What Motivates Individuals to Protect Themselves from Risks: The Case ofWildland Fires	investigates the cognitive perceptual process that homeowners go through when faced with the decision to protect themselves from the risk of wildfires, by looking at the interaction between the integrated protection motivation theory— transtheoretical model and different levels of homeowners’ subjective knowledge related to wildfire risks. ->homeowners in an early or precontemplative stage (both low and high subjective knowledge) as well as low knowledge contemplatives are motivated by their perceived degree of vulnerability to mitigate the risk.
'When you smell smoke…': 'Risk factors' and fire safety in action	examines how fire-safety knowledge is put into action; how knowledge of household fire ‘risk factors’ may gain a concrete existence in the interactions between fire fighters and householders. Using a ‘translation’ model (derived from Actor-Network-Theory), the complexity of the social interactions that constitute safety in action are shown. -> proponents of the ‘risk factors’ approach need to understand the interactions where risk and safety are socially embedded.
Wildfire policy and use of science in the context of a socio-ecological system on the Aegean Archipelago	- summarizes the results of a socio- ecological study on Greek islands to characterize fire science and policy at regional and local levels, and perceptions of fire risk. -> significant lack of financial support and resources exist to support prevention which is relatively inadequate; public participation in fire prevention remains limited.

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7.7. Good Ideas

In deze categorie zijn wetenschappelijke studies opgenomen die een ´creative´ idee representeren. Voorbeelden zijn design initiatieven om de gevaar van cigaretten te verminderen of het gebruiken van dieren om bosbranden te voorspellen. Verder is hier ook een studie die brandweer leden inspireerd in het gebruiken van sociale netwerken om brandpreventie uit te oefenen.

Title	Waar gaat het om?
A field test of the Cougar Home Safety Assessment (version 2.0) in the homes of older persons living alone	Assessment-Tool tested in the residences of 44 older adults who lived alone. Cougar 2.0 includes 52 criteria addressing fire hazards, carbon monoxide detection, electrical/water safety, emergency readiness, and other safety-related characteristics. Some of the safety criteria are assessed by observation, and others require manual testing, such as the presence of working smoke detectors and safe water temperatures.
Animals as Mobile Biological Sensors for Forest Fire Detection	The devices used in this system are animals which are native animals living in forests, sensors (thermo and radiation sensors with GPS features) that measure the temperature and transmit the location of the MBS, access points for wireless communication and a central computer system which classifies of animal actions.
Case Study: Using a Virtual Reality Computer Game to Teach Fire Safety Skills to Children Diagnosed with Fetal Alcohol Syndrome	Children participated in a study by using a multiple baseline, multiple probe design. Before the game, no child could correctly describe what actions to take during a home fire. A computerized game allowed them to learn the recommended safety steps in a virtual world. Skill learning and real-world generalization were tested immediately after the intervention and at 1-week post-test. All children reached 100% accuracy on the computer intervention, defined as successfully completing each of the safety steps. At the 1-week follow-up, all the children were able to perform the steps correctly in a real world simulation.
Development of an Instrument That Assesses Individuals' Burn Prevention Knowledge	This study developed and tested a novel instrument that assessed an individual's burn prevention knowledge. This instrument may be used to evaluate the effect interventions aimed at increasing burn prevention knowledge have on an individual's burn prevention knowledge.
Fire fighters as basic life support responders: A study of successful implementation	aim of this study was to implement a system using Basic Life Support (BLS) responders equipped with an automatic external defibrillator in an area with relatively short emergency medical services' response times. The BLS responders had 1076 patient contacts. In this study, the implementation of BLS responders may have resulted in successful Resuscitations.
Games that ''work'': Using computer games to teach alcohol-affected children about fire and street safety	Although teaching safety skills is recommended to prevent injury, cognitive limitations and behavioral problems characteristic of children with fetal alcohol spectrum disorder make teaching these skills challenging for parents and teachers. In the current study, 32 children, ages 4–10, diagnosed with fetal alcohol syndrome (FAS) and partial FAS, learned fire and street safety through computer games that employed ''virtual worlds'' to teach recommended safety skills. Children were pretested on verbal knowledge of four safety elements for both fire and street safety conditions and then randomly assigned to one condition. After playing the game until mastery, children were retested verbally and asked to ''generalize'' their newly acquired skills in a behavioral context. They were retested after 1 week follow-up. Children showed significantly better knowledge of the game to which they were exposed, immediately

	and at follow-up, and the majority (72%) was able to generalize all four steps within a behavioral setting. Results suggested that this is a highly effective method for teaching safety skills to high-risk children who have learning difficulties.
Hand rolling cigarette papers as the reference point for regulating fire safety	To compare the burning characteristics of the tobacco and paper of manufactured and hand rolled cigarettes, and set a fire safety standard of manufacture to largely reduce the fire risk from discarded cigarettes.
In Search of Effective Education in Burn and Fire Prevention	Burn and fire educators must find a way to reach children that captures their imaginations. There may be no better way than games. Two burn and fire prevention games were developed. The games were distributed to 38 school districts encompassing a total of 164 elementary schools and reaching more than 1,035 youngsters in grades 1 through 4 in a two-county community. Before playing each game, the participants completed a multichoice pretest. A similar posttest was administered after gaming to determine mastery and retention of knowledge. In addition, classroom instructors were given an evaluation form to assess content, quality, and effectiveness. Pretest and posttest results indicated students gained and retained significant knowledge. Instructor evaluation recognized these games as entertaining and exciting.
Integrative Complexity of Public Beliefs Toward Wildfire Management: Development of a Scale	This paper presents the process by which a combination open-ended and fixed-item scale was developed to measure the complexity of thought that is consistent with integrative complexity. We used the controversial issue of wildfire management in developing the scale because it has become a pervasive natural resource concern that has divided the public's perceptions regarding its management. The resulting scale is designed for use in large surveys across any number of natural resource issues.
Islam for fire fighters – A case study on an education program for emergency services	This paper describes an initiative by the Fire and Emergency Services Authority of Western Australia to build its capacity to deal appropriately with an increasingly visible, and marginalized, minority - the Muslim community- through a program designed to raise awareness and understanding among its staff. This paper describes the social, political and organizational context in which the training was developed, and reflects on the personal experiences and lessons learnt by the program developers.
Lessons from the evacuation of the world trade centre, 9/11 2001 for the development of computer-based simulations	This paper reviews the state-of-the-art in evacuation simulations. The development of the Glasgow Evacuation Simulator is used to illustrate the existing generation of tools.
Neural network and GA approaches for dwelling fire occurrence prediction	This paper describes three approaches for the prediction of dwelling fire occurrences in Derbyshire.
Optimizing Emergency Awakening to Audible Smoke Alarms An Update	This review examines research on arousal from sleep in an emergency. It considers whether the current smoke alarm signal is optimal for waking those most at risk of dying in a fire and, if not, how it may be improved. Significant risk factors for staying asleep include high levels of background noise, being a heavy sleeper, sleep deprivation, being a child, hypnotics, alcohol intoxication, and hearing impairment. The high frequency beeping signal was significantly less effective than either a voice alarm or mixed-frequency beeping in waking selected at-risk groups.
Responding to a fire emergency in a virtual environment:	experimental study of participants' response to the sudden appearance of a fire emergency in a virtual environment (VE) and of the adaptivity of

different patterns of action for different situations	their response pattern. A VE has been built in which participants meet two situations: first an explorative navigation and afterwards a hurried escape from the unexpected outbreak of fire. Results show that the appearance of the fire emergency triggers important changes in the way people move in the VE, and that such changes are all adaptive responses to an emergency situation. In conclusion, people show recognition of a dangerous situation in a VE and readily produce adaptive responses, making the VE suitable for emergency simulations and for use as an effective training tool.
Social Media and the Fire Service	This paper focuses on various social media tools and how they are being used by the fire service. It provides implementation strategies for the fire service to use social media for emergency messages and fire safety campaigns. The paper closes with a discussion on the opportunities for the fire service to reach a broader audience with their fire safety messages.
The Design and Development of Fire Edutainment Software and Its Application Research	During fire education, because of the particularity of the fire scene, learners are difficult to truly grasp and apply the relevant knowledge. This study develops game-based educational software. -The learners can better grasp the fire-fighting skills in a more real scene. Game-based learning software saves costs and points out the direction of future educational software.
The Fire-safe Cigarette: A burn prevention Tool	History of cigarettes and legislation.
Using virtual reality to determine how emergency signs facilitate way-finding	Virtual reality; 3 scenarios (one without emergency signs, one with an old-version, and one with a new-version); N=170, divided into 3 groups; engaged in emergency escape game to determine if and how various emergency signs aid in way-finding in the event of an emergency. Presumption of min. escape time= 40 s. Average way-finding time: without any signs= 123.8 s, new-version signs=84.8 s, old-version= 75.6 s; absence of signs= slower escape. Males exhibit better way-finding skills than females. Construction workers and fire safety personnel (combined group), not better than others with less presumed prior experience. Choice between emergency direction sign and an exit door, 42% chose to take the door; majority (60%) chose to turn left versus right.
Video Based Wild Fire Detection at Night	A novel method explicitly developed for video based detection of wildfires at night (in the dark) is presented, comprising 4 sub-algorithms: (i) slow moving video object detection, (ii) bright region detection, (iii) detection of objects exhibiting periodic motion, and (iv) a sub-algorithm interpreting the motion of moving regions in video. Individual decisions of the sub-algorithms are combined together using a least-mean-square(LMS) based decision fusion approach, and fire/nofire decision is reached by an active learning method.
Virtual reality for life skills education: Program evaluation	Program evaluation for a Virtual Reality (VR) pilot project intended to aid deaf children in learning life skills (crossing the street safely, exiting a building during a fire drill, and avoiding situations in which strangers may harm them) .N=50 (ages 5-10). The system overall was well liked and user-friendly as evidenced by the students' ability to complete the tasks accurately and enthusiasm to participate in the project; some shortcomings were identified.

Wildfire detection using lms based active learning	A computer vision based algorithm for wildfire detection is developed.

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7.8. Others

In dit categorie zijn alle overblijvenden studies. De inhoud is relatief divers; er wordt menselijk gedrag tijdens calamiteiten en evacuaties bestudeerd, maar ook nazorg of gevaren die uitgaan van het werken in de community.

Title	Waar gaat het om?
A multiple shutdown method for managing evacuation in case of major fire accidents in chemical clusters	The basic decision model developed in the first part of the article by Reniers et al. is extended to determine both the optimal time and the optimal mode to stop the ongoing activities in case of a major fire possibly giving rise to an escalating event.
A Typology of Residential Fire Survivors' Multidimensional Needs	analysis of the tangible, psychological, and general needs of adults and their children reported by residential fire survivors approximately 14 weeks postfire. Those needing help were more likely to be women with children younger than age 18 living in their household, have low-income status, less education, and to have already received services from church groups. The classification of selfidentified needs of fire survivors included the need for specific tangible and social service assistance, psychological and spiritual support, and nonspecific assistance
Assessment of legibility of egress route in a building from the viewpoint of evacuation behavior	The paper considers the legibility of egress route as the geometric access potential of the egress route network in the architectural plan. The legibility of the egress route is a function of the physical measures that allow quantitative evaluation of how quickly occupants can escape or how easily they can find exits.
Buses as Fire Hazards: A Swedish Problem Only? Suggestions for Fire-Prevention Measures	buses are potential fire and burn hazards, not only when involved in collisions but also in other circumstances. The number of fire incidents is increasing, especially in newer buses. In conjunction with the Swedish Rescue Services Agency, we examined some of the recent bus fires in Sweden. We did not find any casualties, but the results of our study suggest that casualties as a result of bus fires are imminent unless preventive measures are taken. We also studied experiences from previous bus fires and suggest preventive measures.
Dissemination, Implementation, and Widespread Use of Injury Prevention Interventions	Specifically, we emphasize the importance of diffusion of effective interventions to injury prevention and suggest activities that may strengthen the capacity to deliberately spread the use of science-based interventions.
Intentional systems representations are useful alternatives to physical systems representations of fire-related human behavior	This paper discusses how intentional systems representations can describe the cognitively derived responses of people in a more parsimonious manner, and can be used to design fire safety systems that capitalize on the adaptive skills of people. Using the framework of physical versus intentional systems representations, various models of fire-related behavior are reviewed and evaluated.
Fire risk management system for safe operation of large atmospheric storage tanks	This paper has been prepared by its authors to show the benefits coming from the application of the fire risk assessment methodology prepared by the ‘‘LastFire_ Project’’ group of experts.
Lessons from the evacuation of the world trade centre, 9/11 2001 for the development of computer-based simulations	This paper reviews the state-of-the-art in evacuation simulations. The development of the Glasgow Evacuation Simulator is used to illustrate the existing generation of tools.
Management of evacuation in case of fire accidents in chemical industrial areas	This paper develops a tentative approach to calculate the economic gains and/or losses linked to the decision problem whether or not, and when, to evacuate chemical installation(s) threatened by possible domino effect

	risks. The proposed model is illustrated by a case-study based on empirical data.
Neural network and GA approaches for dwelling fire occurrence prediction	This paper describes three approaches for the prediction of dwelling fire occurrences in Derbyshire.
Occupant interactions with self-closing fire doors in private dwellings	Forty semi-structured interviews were conducted with individuals inhabiting a new home. In all of the properties with self-closing fire doors, the occupants reported interfering with the self-closing mechanism of the doors. A quantitative survey was subsequently undertaken to obtain frequency data. In the majority of dwellings with fire doors occupiers reported propping these open in some way, or removing the self-closing mechanism from the door.
Perceived Risk of Home Fire and Escape Plans in Rural Households	Forty-two percent of rural households reported having a fire escape plan. Of the households with a plan, less than two thirds (56.9%) discussed or practiced the plan. Households with children were more likely to develop and practice a fire escape plan. Households with an elderly or disabled person were less likely to develop or practice the plan. Compared to respondents who perceived low or very low risk of home fire, those who perceived a high or very high risk had 3.5 times greater odds of having a fire escape plan and 5.5 times greater odds of discussion or practicing their plan.
Qualitative overview of some important factors affecting the egress of people in hotel fires	This paper briefly reviews some of the important aspects of fire in buildings inhabited by diverse populations, and comments on those factors to be appreciated by management, especially in hotels.
Respiratory Irritants in Australian Bushfire Smoke: Air Toxics Sampling in a Smoke Chamber and During Prescribed Burns	Despite the high frequency of bushfires in Australia, analyses of bushfire smoke components are scarce. As part of an occupational health study investigating the respiratory health effects of bushfire smoke in firefighters, air toxics sampling was undertaken in a smoke chamber and during prescribed burns. Levels of formaldehyde and acrolein were demonstrated at respectively 60% and 80% of the Short Term Exposure Limit in the smoke chamber. Carbon monoxide levels exceeded the peak limit of 400 ppm significantly. Although concentrations were lower during the prescribed burns, the study shows that Australian bushfire smoke contains air toxics of concern.
Respiratory Protection Programs for Firefighters: A Survey of Practices for the State of Kentucky	A survey of Kentucky fire departments was conducted to assess their respiratory protection practices, barriers to program implementation, and medical evaluation programs. This survey indicates that many Kentucky fire departments are not meeting the legal and voluntary respiratory protection standards and guidelines, and demonstrates the need for improved education and funding to ensure that firefighters are adequately protected from respiratory hazards.
Responding to a fire emergency in a virtual environment: different patterns of action for different situations	experimental study of participants' response to the sudden appearance of a fire emergency in a virtual environment (VE) and of the adaptivity of their response pattern. A VE has been built in which participants meet two situations: first an explorative navigation and afterwards a hurried escape from the unexpected outbreak of fire. Results show that the appearance of the fire emergency triggers important changes in the way people move in the VE, and that such changes are all adaptive responses to an emergency situation. In conclusion, people show recognition of a dangerous situation in a VE and readily produce adaptive responses,

	making the VE suitable for emergency simulations and for use as an effective training tool.
Strong Communities What Did Participants Actually Do?	This article examines the characteristics of individuals whom the outreach workers were able to involve in the project, the degree of involvement that various community sectors (eg, fire, police, churches, civic groups) have had, the types of activities that they have undertaken, and the characteristics of volunteer groups that have participated. - Strong Communities has indeed penetrated into the target communities in diverse ways engaging people of disparate backgrounds.
The Implementation and Utility of Fire Incident Reporting Systems: The Delaware Experience	The objectives of this study are to: 1) understand the implementation of DFIRS (Delaware Fire Incident Reporting System); 2) analyze data from DFIRS to describe fire incidents; and 3) inform other states' fire surveillance efforts. Interview; DFIRS captures 100% of Delaware fires reported to fire departments. Fires in which smoke alarms alerted =less likely to result in injury or death.
The Influence of Management on the Cost of Fire Protection	This paper presents an empirical analysis of fire departments that estimates the influence of managerial choices on per capita spending within a simultaneous public production system - managerial practices and decisions influence the cost of a public service.
The interaction between design and occupier behaviour in the safety of new homes	This study examined the interaction between user activity and dwelling design and how this might affect health and safety; aimed to identify how people use features within new homes and how this may limit the protection afforded by building design, codes and regulations. 40 interviews and home inspections. A range of behaviours were reported in relation to building features including fire doors, pipes and cables, and loft access, which may lead to increased risk of injury or ill-health.
The Risk of Acquiring Hepatitis B or C Among Public Safety Workers	To characterize the risk of occupationally acquired infection; articles (N=72) that addressed the transmission of hepatitis B and C in law enforcement, correctional, fire, emergency medical services, and healthcare personnel. - suggest that emergency medical service (EMS) providers are at increased risk of contracting hepatitis B, but data have failed to show an increased prevalence of hepatitis C.
Towards a System-Oriented Framework for Analysing and Evaluating Emergency Response	identifies and discusses aspects of the challenge to evaluate emergency response operations. - the proposed framework may provide a better understanding of how an emergency response system functioned during a specific operation, and help to identify the potential events/circumstances that could significantly affect the performance of the emergency response system.
Using Behavioral Science to Improve Fire Escape Behaviors in Response to a Smoke Alarm	Smoke alarm effectiveness is limited by behavior. few (16%) have escape plans when the alarm sounds. Review to identify behavioral constructs that influence smoke alarm use. Experts identified important behaviors to be addressed by burn-prevention programs and incorporated the constructs into a behavioral model for use in such programs.
Waiting time in emergency evacuation of crowded public transport terminals	Waiting time during emergency evacuation in crowded halls was studied. A waiting time index (WTI) was proposed to quantify jamming at the exits; two evacuation models were applied to study emergency evacuation.

7.8.1. References

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