

DEVELOPMENT AND PREVENTION OF JUVENILE FIRE-RELATED RISK BEHAVIOUR IN THE SOCIAL LEARNING PROCESS

Margo Klaos (corresponding Author), MA

University of Tartu, Institute of Social Studies

PhD student

Estonian Rescue Board

Head of Southern Rescue Centre

Diva Eensoo, PhD

University of Tartu, Department of Family Medicine and Public Health

Analyst

Kadi Luht-Kallas, MSc

University of Tartu, Department of Education

PhD student

Estonian Academy of Security Sciences, Rescue College

Lecturer

Jaanika Piksööt, MSc

National Institute for Health Development, Tallinn

Analyst

Keywords: fire-play, fire setting, risk behaviour, fire prevention,
social learning, school

ABSTRACT

Playing with fire is the most common cause of fire death among children. Although many previous studies have focused on socio-demographic predictors of childhood fire deaths and pathological fire-setting behaviour, less attention has been paid to how the fire-related risk behaviours develop and how they can be reduced by involving schools.

The aim of our research was to determine the main personal and environmental variables shaping children's fire-related risk behaviour during the social learning process. The study was carried out in Estonia with a sample of 903 students from sixth grade classes. We analysed the children's safety knowledge, experiences, social environment, and safety education at school compared to their declared frequency of fire-play.

The study emphasizes the high prevalence of fire-play among students aged 12. We concluded that the most significant predictors of children's high-risk fire-play were: being a boy, living separately from parents, lower fire safety knowledge, history of fire accidents, previous use of fire, parents' unsafe behaviour at home, parents not being role models of safety, and a lower interest to learn safety issues. It is important to consider these risk factors when planning appropriate interventions for fire prevention.

We conclude that in order to equally reach all risk groups it is necessary to develop the schools as community centres of youth injury prevention. We emphasize that schools should have a special role of compensating the deficiencies of knowledge, attitudes, skills, and social network to reduce the youth risk behaviour caused by social inequalities.

INTRODUCTION

Fires are the leading cause of death from injuries at home in children, and such deaths are concentrated in the most deprived populations (Sethi et al., 2008, p.49). Fire-play is the predominant cause of residential fire related injuries and deaths among young children (Istre et al., 2002, p.131). The most common fires that result in the death of a child are started by children, and often the child kills themselves through fire-play (Harpur, Boyce & McConnel, 2013, p.73). The reason for this is mainly their lower cognitive capacity and higher physiological vulnerability. Their curiosity and wish to experiment are not always matched by their capacity to understand or respond to danger. (Istre et al., 2002; Towner & Scott 2008, p8; Harpur, Boyce & McConnel, 2013).

In the literature, the children's fire-related behaviour is often divided into two types: fire-play and fire-setting. The differentiation between these derives from the level of intent and malice. The term fire-play is often used to convey a low level of intent to inflict harm and an absence of malice. Fire-setting is used to describe a higher level of intent. They are also divided based on the age of the children. Younger children usually play with fire because of curiosity or a wish to experiment (fire-play). Youth in their early teens are more involved in intentional and malicious behaviour (referred to as firesetting). Fire-play is usually defined as any form of misuse of fire materials by youth, notably: matches, lighters, and firecrackers, without parental permission or supervision. (Kafry, 1980, p.2; Putnam & Kirkpatrick, 2005, p.2; Hall, 2010, p.6; Harpur, Boyce & McConnel, 2013, p.73).

Experimentation with fire often begins in early childhood, and fire play typically peaks in late childhood or early adolescence (Fessler, 2006, p.429). It has been found that children's highest level of recent fire play is reported at the age of 12, which constitutes the dangerous apex of the combination of factors: willingness to obey rules, more opportunities outside adult supervision, access to sources of ignition, and incomplete mastery of controlling fire (Fessler, 2006, p.437; Grolnick et al 1990, p.131).

The fire fatalities among children are deeply related to one of the central concerns of demography and sociology – the profound inequities of mortality in society (Shai & Lupinacci, 2003). Different studies (Roberts & Power, 1996; Towner & Warda, 1998; Shai & Lupinacci, 2003; Edelman, 2007; Harpur, Boyce & McConnel, 2013) have pointed out the steep social gradient for childhood deaths from house fires. The main factors that raise the risk of fire-setting behaviour and higher mortality are a lower quality of their physical and social environment. They have concluded that the main family factors that predict the increased risk of child fire death or burn injury are: 1) poverty, combined with poor housing conditions and social isolation; 2) single parents; 3) lack of parental education; 4) parent's smoking; 5) inadequate supervision; 6) large families; 7) lack of a functioning smoke alarm. (Towner & Warda, 1998, p.23; Edelman, 2007, p.963; Hall, 2010, p.40; Shai & Lupinacci, 2003, pp.115-122; Harpur, Boyce & McConnel, 2013, p.73; Jennings, 2013, pp.2-4).

Fire-play is also related to problem areas in the children's lives. Children who are involved in fire-play show a higher incidence of different behavioural problems. Child, parent, and family dysfunction increase interpersonal problems and limits positive family interactions that may decrease children's involvement in deviant behaviour. (Kafry, 1980, p.14; Kolko, 2001, p.359; Harpur, Boyce & McConnel, 2013, p.77). Various characteristics of problematic firesetting tend to develop in those who have been inadequately supervised and those with high levels of individual and family psychopathology (Dolan et al., 2011, pp.391).

Most of the main risk factors are difficult to change and therefore need to be considered when designing prevention programs. As children get different social capital and background from home, schools have an important role to play. Bandura (2004, p.158) has argued that it is easier to prevent detrimental health habits than try to change them after they become part of a lifestyle. Prevention of childhood residential fire-related deaths requires much more than a smoke alarm installation program and should be based on the interventions to prevent fire-play in order to be successful (Istre et al., 2002). Possible means of preventing fire-play related injuries include educational programs aimed at children and parents to balance the protective devices and educational efforts (Dietrich, 1952; Istre et al., 2002; Harpur, Boyce & McConnel, 2013). Bandura (2004) points out the very important role of schools in promoting public

health because children can be easily reached. Dougherty et al. (2007) also propose that school-based programs should play an important part in the effort to reach not only the children in the classroom, but also their parents. Most of the previous studies (Towner & Warda, 1998; Istre et al., 2002; Shai & Lupinacci, 2003; Edelman, 2007; Hall, 2010; Harpur, Boyce & McConnel, 2013) have mainly analysed the family-related risk factors of children's fire-play or pointed out the idea that children and parents need special education programs to reduce the fire-play of children; but the certain role of schools is not usually proposed.

Bandura (2004, pp.157-158; 1998, pp.19) has discussed that many of the lifelong habits that jeopardise health are formed during childhood and adolescence, and rooted in familial practices. The social environment has an important influence to the development of children's behaviour during the social learning process. Bandura's (1971) Social Learning Theory gives a good framework to analyse the impact of the social environment on the children's fire-related risk behaviour, and can be used to design school-based fire prevention programs.

The social learning theory extends the learning process beyond the educator-learner relationship to the larger social world; and explains the socialisation process as well as the breakdown of behaviour in society (Braungart & Braungart, 2007, p69). It also explains human behaviour in terms of unidirectional causation, in which behaviour is shaped and controlled either by environmental influences or by internal dispositions (Bandura, 2001). Bandura (2001, p.2) argues that personal factors, behavioural patterns, and environmental events all operate as interacting determinants that influence each other bidirectionally (Figure 1). The theory emphasizes reciprocal determinism in the interaction between people and their environment. It posits that human behaviour is the product of the dynamic interplay of personal, behavioural, and environmental influences. Environmental factors influence individuals and groups, but individuals and groups can also influence their environment and regulate their own behaviour. (McAlister, Perry & Parcel, 2008, pp.170-171). The theory turns attention to the impact of social factors and social context within which learning and behaviour occur (Braungart & Braungart, 2007, p.67). Environmental events in the form of modelling, instruction, and social persuasion affect the person, and the person in

turn evokes different reactions from the environment, depending on his or her personality and physical features. (Grusec, 1992, pp.782-783).

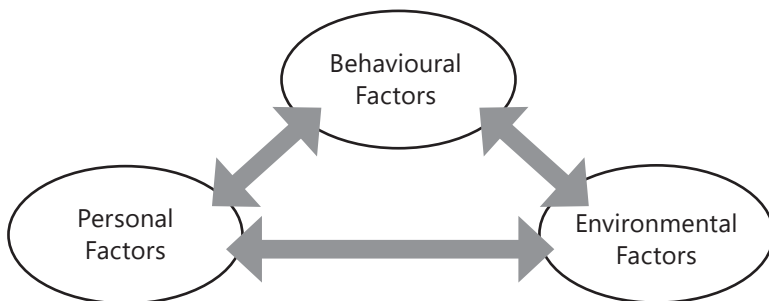


FIGURE 1. Model of triadic reciprocal determinism of social learning theory (Bandura, 1989, p.3).

In the social learning system, new patterns of behaviour can be acquired through direct experience, through social modelling by observing the behaviour of others, or through verbal persuasion (Bandura, 1971, p.3; Rosenstock, Strecher & Becker, 1988, p.180; McAlister, Perry & Parcel, 2008, pp.176-177). This approach emphasizes the importance of exploratory experiences, and imparting of information by social agents in the form of guided instruction and modelling, as a source of change (Grusec, 1992, p.784). Performance accomplishments are the most influential sources of efficacy information because they are based on personal mastery experience. On the other hand, this rudimentary form of learning is largely governed by the rewarding and punishing consequences that follow any given action. Vicarious experience obtained through observation of successful or unsuccessful performance of others is the next most potent and, indeed, may account for a major part of learning throughout life. Verbal persuasion (or exhortation) is frequently used in health education; while it is less powerful than performance accomplishments or vicarious experience, it can still be a useful adjunct to more-powerful influences. (Rosenstock, Strecher & Becker, 1988, p.180; Bandura, 1971, p.3; Bandura, 1977, pp.195-196).

Although many previous studies have focused on socio-demographic predictors of childhood fire death or pathological fire-setting behaviour, less attention has been paid to how the fire-related risk behaviour

develops and can be reduced in the social learning process. The aim of this paper is to determine the main personal and environmental variables influencing and shaping children's fire-related risk behaviour during the social learning process. To reach the goal we compare the children's fire-related behaviour with their safety knowledge, personal experiences, everyday social environment, and safety education at school according to Bandura's (1971) Social Learning Theory. Based on the survey, we argue and intend to make suggestions on how to teach fire safety at school to compensate for deficiencies in children's social learning process.

1. METHODS

1.1 SAMPLE

The current article is based on the study “The Effectiveness of Health Promotion in Estonian Schools“. This study was carried out in the school year 2012/2013 in Estonia. The sample was randomly selected sixth-grade students from the four biggest counties in Estonia, and the two stage sampling technique was implemented: random selection of schools (urban vs rural schools, and Estonian vs Russian speaking schools); and a random selection of single sixth grade classes per school. The sample of the present study included 903 students from 52 schools with a mean age of 12,8 (SD=0,4) who answered the fire safety risk behaviour questionnaire. The sample was composed based on the proportions of sixth-grade students in Estonia, and the total sample included students representative by gender (50,1% of male), residency (81,1% from urban schools), and ethnicity (69% from Estonian speaking schools).

1.2 PROCEDURE

Most of the students filled in the fire safety questionnaire via the web-based LimeSurvey software, as an exception paper forms were also used in the classroom. Questions measuring fire related behaviour (dependent variables), independent variables, and the corresponding coding systems are described in Table 1. The students' fire safety questionnaire was developed by the scientists and experts of the University of Tartu and the Estonian Rescue Board based on previous studies (Kafry, 1980; Grolnick et al., 1990; Fessler, 2006; Morrongiello et al., 2008; Morrongiello, Zdzieborski & Normand, 2010). The questionnaires used in the Russian speaking schools were translated from Estonian into Russian. The questionnaires were administered in the classroom during a 45 min session. When they filled the questionnaire only a study assistant was in the classroom who explained the aim and procedure of the session and if needed answered students' questions. Unique codes were used instead of names on the questionnaires to ensure students' anonymity.

The research project was approved by the Research Ethics Committee of the University of Tartu.

1.3 DATA ANALYSIS

Students were divided into 3 risk groups (High-risk, Low-risk and No-play) based on their reported fire-play during the previous 12 months. The High-risk group includes children who declared playing with fire “very often” or “often”. This group characterises children whose fire-play is usually intentional and malicious, including a wish to burn things. High frequency of fire-play can often lead to dangerous consequences (causing fire, getting injured, etc.). Children who reported playing with fire “sometimes” or “seldom” were classified to the Low-risk group. It describes children who usually have a low level of intent to inflict harm. Fire-play occurs mainly because of curiosity and awareness of matches. Despite the lower frequency the consequences of fire-play might still be dangerous. Children who have not declared playing with fire recently belong to the No-play group that is used as a reference group. (Kafry, 1980, p.2; Kolko, 2001, p.359; Putnam & Kirkpatrick, 2005, p.2; Fessler, 2006, p.436; Hall, 2010, p.6; Harpur, Boyce & McConnel, 2013, p.73)

Simple logistic regression analysis was used to assess how the individual and environmental variables predict belonging to the High-risk and Low-risk group compared to the No-play group. Results were provided as odds ratios and 95% confidence intervals. For statistical analyses, SPSS 20 software (IMB Statistics) was used. Values of $p < .05$ were considered statistically significant.

TABLE 1. Description of analysed measures.

Measure	Description of measures / examples
BEHAVIOUR	
Belonging to the risk-group	<p>“Have you played with matches, lighters or any other source of ignition during the last 12 months?” Responses to the 5-point frequency scale – „very often“ to „no play“ – were categorised into three groups:</p> <p>1) High-risk group – “very often” and “often”; 2) Low-risk group – “sometimes” and “seldom”; 3) No-play group – “not played”.</p>
PERSONAL FACTORS	
Socio-demographic background	<p>Gender – male/female.</p> <p>Ethnicity (based on the language of school) – Estonian/ Russian.</p> <p>Residency – urban/rural.</p> <p>Family (living together with 2 parents, single parent, or living separately from parents most of the days during the week).</p> <p>Type of heating: fireplace or stove at home (yes/no).</p>
Knowledge and skills	
Knowledge of fire risk	<p>We asked 8 questions about the risk of fire, spread of fire, and the health risks; with multiple-choice answers with one right answer. We standardised the right answers to describe the level of knowledge on a 100 point scale. e.g., “What is the biggest risk to health during a fire?”</p>
Knowledge of right behaviour during fire	<p>We asked 4 questions about the right behaviour during a fire; with multiple-choice and yes/no answers. Every question had only one right answer. We standardised the right answers to describe the level of knowledge on a 100 point scale. e.g., “Which is the safest mode to leave the room during a fire?”</p>
Self-estimated skills of safety	<p>We evaluated the children’s self-estimation of their skills: 1) using a fire extinguisher, and 2) making a campfire. (yes or no)</p>
Self-reported behaviour during fire	<p>We asked about children’s behaviour in case of a fire at home with 4 answers. First, we compared the highest-level risk behaviour (“I will definitely start to extinguish the fire”) with the other answers (classified as yes vs no). Secondly, we compared the safest behaviour (“I will leave the house immediately and call for help”) with the other answers (classified as yes vs no).</p>

TABLE 1. Continued

Direct personal experience with fire	
Personal negative experience of a fire accident	We asked about 3 opportunities of previous negative experience – fire accident at home, child caused a fire, or someone close has been injured or died in a fire accident. If any of these questions was answered “yes”, we labelled the person as “experienced”.
Personal experience with the use of fire	Four items were used to measure if and how children got personal experience in using fire in last 12 months: 1) heating the oven, 2) making a campfire, 3) burning a candle, 4) smoking. We evaluated separately each of these experiences, (yes or no).
FACTORS OF SOCIAL ENVIRONMENT	
Observational learning	
Parents’ related safety behaviour at home and the role and example of parents	Four items were used: 1) was a smoke detector installed (yes or no); 2) was the smoke detector tested and maintained (yes or no); 3) if there is a smoker in the household (yes or no); 4) who heats the oven or fireplace (children or only adults).
Personal role models	The children were asked who do they set as an example of fire safety with multiple-choices (e.g. mother, father, friend, celebrity or media-stars), (yes or no for each choice).
Verbal persuasion	
Source of warning about fire dangers?	We asked who has warned about fire dangers. The question was with multiple choices (e.g. mother, father, and friends), (yes or no for each choice).
Source of fire safety information and knowledge	Where have they got their knowledge of fire safety? Multiple choices (e.g. friends, parents, internet, fire service, etc), (yes or no for each choice).
Fire safety activities at school	E.g. participating in the safety camp, (yes or no).
Expectations for fire safety activities at school	We asked the students to evaluate opportunities of how school can help to raise children’s safe behaviour (e.g. if the safety issues should be cross-curricular topics). We also asked if children are interested in learning to make a campfire or to use a fire extinguisher, (yes or no).

RESULTS

We analysed fire-play based on different levels of risk – High-risk and Low-risk versus No-play. The distribution of children by risk of fire-play (Table 2) revealed that 54.8% of the sample reported playing with fire during the last 12 months. We expect that for the children of the Low-risk group the main motives for fire starting might be fun and curiosity, and their fire-play depends much on the involvement with and/or awareness of fire as supposed by Kolko (2001, p.359) and Fessler (2006, p.436). Children from the High-risk group have reported playing with fire often or very often and we suppose that this is a possible warning of risk behaviour that is far beyond normal curiosity.

TABLE 2. Children’s distribution by the risk groups of fire-play.

Risk group	N	%
High-risk	134	14.8
Low-risk	361	40.0
No-play	408	45.2

TABLE 3. Personal factors predicting the risk of playing with fire.

Socio-demographic predictors	High-risk vs No-play OR (95% CI)	Low-risk vs No-play OR (95% CI)
Gender: male vs female	2.81 (1.87-4.22)	1.78 (1.34-2.37)
Ethnicity: Estonian vs Russian	1.055 (.698-1,594)	1.57 (1.15-2.14)
Residency: urban vs rural area	.74 (.46-1.21)	.80 (.55-1.14)
Family: living without parents vs 2 parents	4.89 (1.52-15.80)	1.67 (.52-1.64)
Family: single parent vs 2 parents	1.40 (.87-2.25)	1.15 (.81-1.64)
Type of heating: fireplace or stove at home (yes vs no)	.91 (.61-1.35)	1.34 (1.01-1.78)

Knowledge and skills		
Knowledge of fire risk	.79 (.70-.90)	.93 (.85-1.03)
Knowledge of right behaviour during fire	.69 (.57-.85)	1.00 (.84-1.18)

TABLE 3. Continued

Self-reported dangerous behaviour: „In case of fire I will definitely start to extinguish the fire“ (yes vs no)	2.21 (1.35-3.62)	1.03 (.67-1.57)
Self-reported safe behaviour: „ In case of fire I will leave the house immediately and call for help“ (yes vs no)	.37 (.24-.56)	.74 (.55-1.00)
I can make a campfire (yes vs no)	3,60 (2.21-5.84)	2.29 (1.69-3.11)
I can use a fire extinguisher (yes vs no)	1.97 (1.32-2,939)	1.43 (1.07-1.90)

Direct personal experiences with fire		
Personal negative experience with a fire accident (yes vs no)	3,29 (2.14-5.06.)	1.72 (1.22-2.43)
I have made a campfire (yes vs no)	11.98 (7.06-20.33)	4.20 (3.10-5.70)
I have smoked (yes vs no)	8.94 (5.60-14.30)	4.31 (3.06-6.09)
I have heated an oven (yes vs no)	5.44 (3.47-8.52)	2.82 (2.10-3.79)
I have burned a candle (yes vs no)	4.84 (2.52-9.30)	4.56 (3.00-6.94)

Values $p < .05$ are marked in Bold.

Table 3 gives an overview of the main differences of personal factors that describe (portrait) the risk groups. The results show two significant demographic variables that predict belonging to the High-risk group: family structure and gender. Among socio-demographic variables, the strongest predictor of high-risk behaviour is children living without parents. We did not find living with a single parent to be a significant predictor of children's high-risk behaviour. There are also a significant number of gender related differences in playing with fire. Being a boy is a significant predictor of belonging to the High-risk group and to the Low-risk group compared to the No-play group. We also concluded that it is more likely to belong to the Low-risk group for Estonians and children from homes with a fireplace or stove compared to the No-play group. Still, these factors did not predict of belonging to the High-risk group. There was no significant difference in playing with fire between children living in urban or rural areas.

Analysis shows that previous personal experience with fire-incidents at home or among peers predicts children's higher fire-related risk

behaviour. There are significant differences between risk groups in experiences of using fire sources during the last 12 months. Children from the High-risk group have a lot of practice in outdoor activities like making a campfire and smoking compared to the No-play group. When comparing the indoor activities (heating the oven and burning a candle) we see a lower impact, but still strong significant differences between the High-risk and No-play groups. Children’s experiences with the use of fire strongly predict their higher activity in playing with fire and therefore belonging to the High-risk group; especially when we evaluate their outdoor risk behaviour.

Children in the High-risk group have a lower knowledge of the risks of fire and safe behaviour during a fire. Their declared behaviour during a fire differs dangerously from the children from the No-play group. It is more likely that in case of fire they start to extinguish the fire by themselves and less likely that they are going to evacuate from the building and call the emergency services than the No-play group. Children from the higher risk groups tend to underestimate the risk of fire and overestimate their own capabilities of action that might lead them to dangerous and risky behaviour.

TABLE 4. Factors of social environment predicting the risk of playing with fire

Observational learning	High-risk vs No-play OR (95% CI)	Low-risk vs No-play OR (95% CI)
Children are heating the oven (children vs only adults)	2.55 (1.41-4.60)	1.39 (.93-2.09)
Having a smoke detector at home (no vs yes)	2.17 (1.27-3.71)	1.66 (1.09-2.55)
Family member smokes (yes vs no)	1.71 (1.10-2.67)	1.49 (1.10-2.03)
Smoke detectors checked (no vs yes)	1.38 (.93-2.05)	1.46 (1.10-1.94)
Mother is a role model (yes vs no)	.42 (.27-.66)	.90 (.63-1.30)
Father is a role model (yes vs no)	.67 (.44-1.01)	1.23 (.89-1.68)
Friend is a role model (yes vs no)	1.60 (1.03-2.50)	1.61 (1.16-2.24)
Celebrity or media-star is a role model (yes vs no)	2.61 (1.22-5.58)	1.96 (1.04-3.70)
Verbal persuasion		
Mother has warned of dangers (yes vs no)	.43 (.26-.71)	1.00 (.64-1.55)

TABLE 4. Continues

Father has warned of dangers (yes vs no)	.62 (.41-.94)	1.43 (1.01-2.01)
Friend has warned of dangers (yes vs no)	2.16 (1.39-3.34)	1.87 (1.34-2.61)
I have learned from parents (yes vs no)	.23 (.12-.45)	.53 (.29-.95)
I have learned from teaching materials (yes vs no)	.49 (.30-.80)	1.19 (.79-1.79)
I have learned from fire and rescue authorities (yes vs no)	.93 (.55-1.59)	1.41 (.95-2.11)
I have learned from a class teacher (yes vs no)	.58 (.36-.93)	.85 (.58-1.22)
I have learned from the internet (yes vs no)	.99 (.62-1.60)	1.14 (.81-1.59)
I have learned from friends (yes vs no)	2.33 (1.54-3.54)	1.38 (1.03-1.85)
I have learned from safety camp (yes vs no)	1.38 (.89-2.15)	1.05 (.76-1.44)
I have shared the new knowledge from school with parents (yes vs no)	.93 (.61-1.42)	.91 (.67-1.23)
I have participated in the „ <i>Kaitse end ja aita teist</i> “ (“Protect Yourself and Help Others”) safety programm (yes vs no)	1.83 (1.20-2.81)	1.31 (.95-1.81)
Dealing with fire safety issues at school in the last 12 months (yes vs no)	.69 (.57-.83)	.88 (.77-1.01)

Expectations for fire safety activities at school		
Teachers should involve the safety issues as cross-curricular topics (yes vs no)	.89 (.59-1.34)	1.15 (.86-1.54)
Planning regular fire drills (yes vs no)	.51 (.33-.79)	1.21 (.84-1.74)
Participation in the activities of the rescue service (i.e. visiting fire station; public fire safety day) (yes vs no)	.65 (.43-.97)	.81 (.60-1.08)
I wish to learn about making a campfire (yes vs no)	.62 (.42-.93)	1.03 (.77-1.37)
I want to learn to use a fire extinguisher (yes vs no)	.49 (.33-.73)	.74 (.55-.99)

Values $p < .05$ are marked in Bold.

Table 4 provides an overview of the factors of social environment that characterise most of the differences in children’s fire-related behaviour during the social learning process. When evaluating the role and example of parent’s safety behaviour, especially the role of the mother, we can see this is a significant predictor of children’s fire-related risk behaviour. Nevertheless, it can be seen that in the High-risk group, parents are not

as important role models as in the No-play group. The analyses show that children from homes where the children heat the oven instead of the parents, homes without a smoke detector, and homes where at least one of the parents smokes – are more likely to belong to the High-risk group compared to the No-play group. Missing smoke detectors and parent's smoking also predicts belonging to the Low-risk group compared to the No-play group. The results demonstrate that parents' unsafe behaviour is a significant predictor of children's fire-related risk behaviour that can lead to serious consequences.

Students from the High- and Low-risk group have higher odds of the influence and example of celebrities and friends compared to the No-play group. At the same time, only the High-risk group has declared lower odds of the influence of grown-ups – especially the mother. We can point out the important role of the mother as an influence and example in safety behaviour. We can conclude that students who do not see parents as examples, but at the same time take celebrities and friends as influencers show higher odds of fire-related risk behaviour.

There are a number of statistically significant differences between risk groups in the area of verbal persuasion. The analysis shows that students whose mother's and father's role in warning against dangers is low, have higher odds of high-risk fire-related behaviour. When analysing the parents' role in teaching, it revealed that students who have declared the lowest level of learning from parents have significant odds of belonging to the High-risk group. They are also the ones who have got less knowledge from the learning materials and from the class teacher compared to the No-play group. At the same time they have stated getting warned against dangers and learning safety issues from their friends that let us conclude that declaring learning from friends is a predictor of belonging to the High-risk group. But as High-risk students report more that they are involved in the "*Kaitse end ja aita teist*" ("Protect Yourself and Help Others") safety program at school this led us to believe that they like and remember these activities more than the No-play group.

Besides the differences, it is also important to find out the receptivity sources of knowledge where risk groups do not differ. Analysis revealed that getting knowledge from the fire authorities and from the internet does not give higher odds of belonging to any risk groups. We also see

that students from all risk groups are aware of sharing the knowledge from school with their parents.

Analysing the students' expectations for fire safety activities at school reveals that lower interest to take part in fire drills and fire service activities predicts belonging to the High-risk group. An interesting finding is that lower interest to learn practically making a campfire and using a fire extinguisher shows higher odds of belonging to the High-risk group. Students of different risk groups do not differ by the statement that teachers should involve safety issues as cross-curricular topics.

3. DISCUSSION

Based on our study we can emphasize the high prevalence of fire play among the young people. More than half of the 12 years old children of our study have played with fire during the last year and almost one in seven of them belong to the High-risk group. According to the earlier studies, Kolko (2002, p.17) concluded that among the school-aged youth, as many as 45% of students in primary grades acknowledge having played with fire. Different earlier surveys have found that fire play typically peaks in late childhood or early adolescence (Fessler, 2006, p.429); and children at the age of 12 have reported the highest level of recent fire play (Grolnick et al., 1990, p.131). Dolan et al. (2011, p.391) pointed out that by the age of 10 years most children have reasonable knowledge of fire safety, and the problematic firesetting tends to develop in those who have been inadequately supervised and those with high levels of individual and family psychopathology. Therefore, we can point out that a high level of fire play is not a minor problem, but a high potential risk that needs to be managed, not only by limitations and restrictions, but also by smart teaching and prevention work at school together with families and members of the community. It is also important to consider the children from different risk groups when planning appropriate prevention activities. We conclude our suggestions in the next chapters.

3.1 PERSONAL FACTORS AND FIRE-RELATED RISK BEHAVIOUR

3.1.1 Socio-demographic predictors

Our study finds that gender is an important variable to explain socio-demographic differences of playing with fire. Boys play much more often with fire than girls. Surveys based on the fire statistics usually present the risk of fire-play as a “boys’ problem” because 9 of 10 fires caused by playing were set by boys (Kafry, 1980, p.4; Ying & Ho, 2001, p.40; Dadds & Fraser, 2006, pp.584-585; Evarts, 2011, p.7). An interesting finding in the present study is that the gender difference is smaller when comparing the rare fire-play (mainly playing because of curiosity), but much bigger when children play with fire often. Morrongiello (1996, p.499) concluded

that in comparison to girls, boys reported more injuries and close calls, were more likely to repeat behaviours that had resulted in prior injuries, and were less likely to tell their parents about the events. One of the reasons for this is that parents socialise boys and girls differently regarding risk taking (Morrongiello, Zdzieborski & Normand, 2010, p.328). Thus we can conclude that in the teaching process it is important to pay equal attention to both – boys and girls – when preventing the risks of fire-play and pay extra attention to reduce the boys' risk of fire-setting behaviour.

Our study shows that the most important socio-demographic predictor of children's high-risk behaviour was related to the structure of the family. Children living without both of their parents were most likely to show high-risk fire-related behaviour. Family-related predictors of children's problematic fire-setting behaviour have usually been associated with deprivation, unstable family units, and family psychopathology that is very often a reason for inadequate supervision (Harpur, Boyce & McConnel, 2013, p.77; Dolan et al., 2011, p.391). It can also lead to the lack of teaching safety issues at home and missing parental role models for safety. Although, many previous surveys and reviews (Kafry, 1980, p.9; Kendrick et al., 2010, p.3; Edelman, 2007, p.963; Dolan et al., 2011, p.387; Jennings, 2013, p.4) have pointed out the higher risk of injury in children from single parent and step parent families than those from two (natural) parent families, we did not find a statistically significant difference in risk behaviour between children from single parent and two parent families. Further research is needed to find out if the bigger everyday mobility in society and less time spent with the family have reduced the differences of parental support between families with both parents and a single parent. Children who are living together with both parents have much lower risk behaviour compared to ones who are living separately from parents most of the days during the week. Schools together with the community should pay extra attention to support, teach, and include the children who are living in dormitories, orphanages, or other places without parents.

The study concludes an interesting finding related to the role of the fire-place at home to children's fire-play. It has a statistically significant relation of belonging to the Low-risk group, but not to the High-risk group compared to the No-play group. Although the availability of sources of ignition was found to be a significant predictor of fire-play in many

studies (Grolnick et al., 1990; Towner & Warda, 1998, p.20; Harpur, Boyce & McConnel, 2013, p.79), we found that for the age-group 10-13 it is not the main reason. We find that the availability of sources of ignition enables the interest in fire-play, but it does not have an impact for high-risk fire-setting behaviour. Dietrich (1952, p.851) has analysed the efficacy of protective devices and educational efforts and emphasizes that these must be appropriate for the child's age, sex, developmental achievements, and opportunities. Hiding the sources of ignition is an important prevention measure for avoiding playing with fire because of curiosity among young children, but is not enough to prevent the fire-setting behaviour in the age group 10-13. High-risk fire related behaviour is not caused by the availability of sources of ignition, but still supports it.

3.1.2 Knowledge and skills

The current study shows that lower knowledge about the risk of fire and about safe behaviour during fire predicts higher fire-setting behaviour during early adolescence. Children who belong to the High-risk group had lower knowledge in most of the important fire safety issues (e.g. health risks, speed of fire spread, threats of using fire, fire safety requirements; evacuation, etc.) compared to the No-play group. The relationship between knowledge and risk-taking behaviour shows controversial results in the different studies. Grolnick et al. (1990, p.134) found that understanding the destructiveness of fire was unrelated to fire play. It is also concluded that better safety knowledge does not play a role in risk-taking behaviour (Schieber & Vegega, 2002; Zeedyk et al., 2001). Fessler (2006) discussed that knowledge regarding institutionally-conveyed fire safety practices had no relationship with the extent of fire play because the principal motives for fire starting are “just for fun”, “to see what would happen”, “to destroy something”, and “boredom”. On the opposite side, Kolko (2001, p.359) declared that limited fire competence supports fire-play, that is consistent to our study.

Children's lower understanding of the risks of fire leads to more frequent and dangerous fire-play; and they would also more likely choose the more dangerous behaviour and make a wrong decision if they have to choose between extinguishing a fire or evacuating the room. The results

of our study showed that the High-risk group were more likely to start to extinguish the fire and less likely to evacuate from the building than the No-play group. Several authors underline that overestimation of their physical abilities and perception of control over dangerous situations are positively related to fire play and are the reasons for making errors (Grolnick et al., 1990, p.134; Schwebel & Plumert, 1999, p.702). We also found that children who reported high or low level fire-play estimate their skills of making a fire and using a fire-extinguisher much higher than children of the No-play group.

Present findings indicate that high-risk behaviour is related to lower knowledge. Therefore, it is important to focus on educating the children from the High-risk group by teaching them safety issues. Teaching fire safety at school should take this into account and use suitable methods when teaching children who underestimate the risk of fire and overestimate their own skills. It is very important that teaching fire related topics is focused on safety behaviour. Especially when teaching children from the High-risk group who have a higher, but often inadequate perception of their skills. For example, when teaching the use of a fire extinguisher it is extremely important to teach in which conditions it is safe enough to use an extinguisher during a fire. We admit that narrow factual based knowledge is not enough to reduce risk behaviour and agree with Morrogiello (2008, p.178) that interventions need to include promoting positive attitudes towards safe behaviour. We also emphasize that teaching should be appropriate to the age of the children.

3.1.3 Learning by direct personal experiences

In our study, we analysed the associations of negative and positive experiences of fire-play. The current study shows that students who have had previous negative experiences with fire (fire at home, caused fire by themselves, etc) still have declared higher fire-play during the last 12 months. We can deduce from this that earlier negative experiences do not have enough impact to reduce the interest in fire-play. Kafry (1980, p.11) also realised that accidents in the children's past are one of the frequent problems that is common for children who have often played with fire. Morrongiello et al. (2008, p.178) have similar findings that children

who have had more prior injury experiences are more likely to report risky practices, hence, they do not learn risk avoidance from injury experiences. This result does not support the conclusion of Cole et al. (2006) who found that 9 out of 10 children who have started a fire never started another once they see the consequences of their actions. Morrongiello et al. (2008) has explained that experiencing a serious injury does not deter children from avoiding the risk behaviour that led to injury because they are attributing injury to bad luck, as opposed to their own behaviour, or their attitudes towards safety rules. This finding suggests expanding child-directed injury prevention interventions to focus more on attitudes (Morrongiello et al., 2008, 179).

We compared the students' exposure to different kinds of fire-related activities and found that the more experience they have the more frequently they have also declared playing with fire. We found that making a campfire, smoking, heating the stove, and burning candles are important predictors of frequent fire play. It confirms the idea that the more practice a child has with fire, the more competent and falsely "in control" he or she may feel, which is likely to increase the behaviour rather than extinguish it (Grolnick et al., 1990). The earlier a child gets the "positive" experiences the harder it is to convince them about the danger of fire and change their risky behaviour. Kolko (2002, pp.19-20) claims that it is quite impossible to convince even a 4-years-old child about the danger of playing with fire if a child has played with fire a few times, and nothing bad happened. The importance of learning by personal experiences is one of the cornerstones of Social Learning Theory. It is stated that the practical implementation of a new skill is more likely to lead to a lasting change in behaviour than written or oral persuasion or exemplary action by others (Farquhar et al., 1991, p.333).

Our findings confirm that children who have got successful experiences (rewarding) with the use of fire are estimating their skills high and tend to play with fire more often. At the same time, we got controversial results to the expected impact of the negative experiences. Despite their negative or unsuccessful experiences (punishing consequences) with fire, children still reported a high level of skills and higher frequency of fire-play. Social learning theory explains that one way how the behaviour can be shaped is by rewarding and punishing consequences (Bandura, 1971, p.5). Performance accomplishment as a source of efficacy information is

especially influential: successes raise mastery expectations, but repeated failures lower them, particularly if mishaps occur early in the course of the event (Bandura, 1977, p.195). We can conclude that negative experiences are surprisingly not as good to shape the safety experiences as we expected. We therefore recommend paying more attention to children who have been exposed to fire incidents.

Prevention should focus on the interventions that help to avoid children's trial-and-error experiences in a dangerous way. It includes the parents' responsibility to keep matches away from children and teaching the safe use of fire related equipment. Trainings must provide practical, positive, and correct skills for safety. It is important to plan the interventions before they gain experiences on their own based on their age-appropriate interest. Children who have personal experience with fire without previous safety instruction should be taken as a special vulnerable risk group when planning fire safety prevention work. It is important that schools, families, communities, and relevant authorities are sharing information about the children at risk and plan the interventions in good cooperation.

3.2 FACTORS OF SOCIAL ENVIRONMENT

3.2.1 Observational Learning

The study shows that children whose family members smoke have a higher likelihood to belong to the High-risk group. Smoking has been shown as the most common risk factor associated with parents; 8 of the 9 fire starters (88%) had at least one parent/carer that smoked and, undeniably, incidents of fire-play were strongly influenced by parents' smoking habits - children attempted to copy the physical act of igniting objects. (Harpur, Boyce & McConnel, 2013, p.79). Children's attitudes to fire safety and safe behaviour depend a lot on the behaviour of adults. Important factors that predict children's high-risk behaviour are related with the parents' dangerous behaviour and unsafe home environment. Parents should be very aware of their own safe behaviour and be ready to teach them critical safety messages on a one-to-one basis (Kolko, 2002, p.20). Missing or regularly untested smoke detectors show

the carelessness and underestimation of home fire safety by parents. That shapes the attitudes and habits of children.

An interesting finding is that a significant predictor of high interest in playing with fire is the assignment of responsibilities at home - that parents are having their children heat the oven or fireplace themselves. In these homes, the children's use of fire is accepted and matches or lighters are more easily accessible. We might presume that these children have acquired the experience of using matches with practical purposes, so they do not have an interest to play with matches at all, but the study showed the opposite. Children who have used the fire in the special safe place might perceive the dangers inadequately and based on positive experiences play more with fire.

When analysing the place of previous experiences of the High-risk group with the use of fire we can see the predominance of outside fire-related activities (making a campfire and smoking). Dougherty et al. (2007, p.473) compared the age groups 6-10 and 11-17 and found that fire-play outside the home increases for older students. An important difference between these age groups is the motivation behind fire-play. For the younger children it is based on curiosity, while for the older age group the most common perceived motivations were peer-pressure and impulse control. Henderson & MacKay (2009, p.132) found that 79% of the children who have engaged in fire-starting had fire-related episodes involving participation with other children. We can conclude that peer-pressure is an important variable for the High-risk group at the age of 12, but it does not have an extra impact for playing with fire because of curiosity. At this age the decrease of parental supervision and increase of peer-pressure are having an important impact on the risk behaviour. Morrongiello et al. (2008, p.179) propose to target groups of friends, as opposed simply to individuals, when planning interventions that promote positive attitudes toward safety issues because of the increasing importance of peer opinion in teenagers.

We found that children's risk behaviour depends a lot on their social relations inside and outside the family. Children who declared lower trust of their parents and higher trust to celebrities and friends as an example of their safety behaviour have a higher likelihood to belong to the High-risk group. It also means that children from the High-risk

group are less reachable through their parents. That states a challenge for schools, rescue services, and the community to influence these children's attitudes to trust and learn safety issues at school. We can conclude that parents' unsafe behaviour is a significant predictor of children's high fire-related risk behaviour because of the failed results of observational learning. Considering the importance of observational learning in children's risk behaviour, it is necessary to teach parents, and emphasize the importance of their position as role models in fire-safe behaviour. Interventions aimed at children need to take into account the child's social relationships in order to find out who may have the greatest influence on their behaviour. To change the attitudes toward safe behaviour of teens it is useful to organise attractive courses to the groups of friends or youth in the environment that interests them. Celebrities and influencers can also be used to support the spread of safety attitudes.

3.2.2 Verbal persuasion and expectations for schools

The study shows that children from the High-risk group tend to evaluate the role of education and verbal persuasion low to get new knowledge and skills. At the same time, they declared more personal experiences with fire, and we also conclude that they have not had a good social environment to get positive vicarious experiences. These findings confirm the previous conclusions that verbal persuasion is less powerful than performance accomplishment or vicarious experience (Rosenstock, Strecher & Becker, 1988, p.180; Bandura, 1977, p.198; Bandura, 1971, p.3). Based on the findings described in the previous chapters we claim that the main reason for the inefficiency of teaching is that many target groups are reached too late and the previous social learning process has already created inadequate knowledge, which is an unsuitable ground for new knowledge and retraining. Towner (1995, p.58) has emphasized that the challenge is to make the educational process more effective in all contexts in which it takes place and guarantee that it suits the target group.

We found significant differences between risk groups when they described their sources of fire safety knowledge. Children who belong to the High-risk group have declared a significantly lower role of parents in the teaching process than the No-play group. These children declare

getting knowledge from their friends. Missing the role of parents in the teaching process is one of the strongest predictors of children's fire-related risk behaviour. Boles et al. (2005, p.568) explained that children who reported less vulnerability to become injured at home were significantly more likely to engage in risky behaviour. That might be the direct consequence if the parents' role of warning children about the risks is insufficient. To decrease the number of children who belong to the High-risk group, it is important to increase the role of their parents to teach children, to behave as good examples, and guarantee the adequate parental supervision of children's safety behaviour. One of the opportunities is to use special fire safety courses for parents of the children from the High-risk group. Carroll et al. (1986) concluded that parental involvement in educational interventions has significantly increased the implementation of fire safety into the home. Harpur, Boyce & McConnel (2013) have also suggested that future prevention strategies should focus on reaching the parents of those deemed to be at risk. We propose that teachers development discussions with parents should have an important role in cooperation where they also discuss the child's possible risk behaviour and opportunities to work on the problem together.

Based on different studies Dougherty et al. (2007, p.475) have concluded that school-based programs can play an important part in the effort to reach not only the children in the classroom, but also their parents through discussion generated outside the classroom and take-home exercises that involve the parents. Our findings confirm this and surprisingly it revealed that although children from different risk groups evaluate the teaching at school very differently, we did not find significant differences between risk-groups to share the new knowledge from school with their parents.

Teaching safety issues to the children from the High-risk group is definitely challenging. Compared to the No-play group they have declared significantly lower interest in learning practical skills (e.g. making a campfire and the use of a fire extinguisher) or participating in regular fire drills and in different activities outside the school together with the rescue service. An interesting finding is that children from the High-risk group underestimate the role of teaching fire safety issues at school, but at the same time they have declared higher participation in the "*Kaitse end ja aita teist*" ("Protect Yourself and Help Others") course, which is a

more practical safety course. Based on this contradiction we propose to focus on practical skills when teaching safety issues at school and combine these with theoretical information that helps them better understand the risks in their everyday environment. Bandura (2004, p.158) also worried that educational efforts to promote health of youths usually produce weak results because they provide factual information and usually do little to equip children with the skills and efficacy beliefs. We conclude that despite the High-risk group's low interest in participating in educational programs, the usefulness of training practical skills at schools is promising. It is important that the main aim of teaching is to turn an interest in fire-setting to an interest in fire safety; and educational programs are tailored to the developmental level of the child and focused on the strategies for staying safe (Sharp et al., 2006, p.333; Kolko, 2002, p.26). Therefore, it is especially important to design very exciting hands-on trainings that will influence their skills and attitudes towards safe behaviour. To reach better to the most vulnerable children we also propose the wider use of schools' good practice to prefer sending children with higher risk behaviour to the safety camps.

Our study shows that the studied groups did not differ by the receptivity of learning fire safety issues from the internet, rescue authorities, fire camp, and subject teachers. There was also no difference between risk groups for the suggestion that teachers should involve safety issues as cross-curricular topics. Still, the High-risk group is less receptive to learning from a class teacher or learning from study materials by themselves, compared to the No-play group. It provides guidance on how to organise teaching so that children from different risk groups are equally interested and involved. The solution might be to use rescue service personnel together with teachers and teach it as cross-curricular topic at school. That kind of comprehensive approach where emergency service personnel, teachers, and community groups are combined has been proposed as an effective and successful method to teach fire safety skills (Dougherty et al., 2007, p.475; Sharp et al., 2006, p.334; Bandura, 2004, p.158; Warda, Tenenbein & Moffatt, 1999, p.224).

We can expect that school has an important role as a social balancer for children who have a deficit of knowledge and social support at home and belong to the high risk group. School has a challenge to fill the gaps of safety knowledge and change the children's attitudes to create them

equal opportunities and conditions for the future. That supports the idea that new school-based models of health promotion should operate together with the home, the community, and society at large (Bandura, 2004, p.158).

School also has an important role as an example of valuing safety culture. We have to bear in mind that children's homes and social relations are different; and it influences the children's safety attitudes through their lifespan. The primary role of school is to act as a role model when planning the safe environment for students, when organising fire evacuation drills, or when sharing the safety information. Schools should aim to be the ideal environment for children to feel safe, especially for the most vulnerable ones.

ACKNOWLEDGEMENT

This work was supported by the Health Promotion Research Programme and funded by the European Regional Development Fund under Grant TerVE, 3.2.1002.11-0002, the Estonian Research Council, and Institutional Research Funding under Grant IUT20-40.

DISCLOSURE STATEMENT

No potential conflicts of interest were reported by the authors.

Contacts:

Margo Klaos

University of Tartu, Institute of Social
Studies, Tartu, Estonia
Estonian Rescue Board, Southern Rescue
Centre, Tartu, Estonia
E-mail: margo.klaos@eesti.ee
Phone: +503 5112

Diva Eensoo

University of Tartu, Department of
Family Medicine and Public Health,
Tartu, Estonia
E-mail: diva.eensoo@ut.ee

Kadi Luht-Kallas

University of Tartu, Department of
Education, Tartu, Estonia
Estonian Academy of Security Sciences,
Rescue College, Tallinn, Estonia
E-mail: kadi.luht-kallas@sisekaitse.ee

Jaanika Piksööt

National Institute for Health
Development, Tallinn, Estonia
E-mail: jaanika.piksoot@tai.ee

REFERENCES AND SOURCES

- Bandura, A. (1971) *Social Learning Theory*. New York: General Learning Press.
- Bandura, A. (1977) Self-efficacy: Toward a Unifying Theory of Behavioral Change. *Psychological Review*, 84 (2), pp 191-215.
- Bandura, A. (1989) Social Cognitive Theory. In Vasta, R. (ed.). *Annals of child development*. Vol. 6. *Six theories of child development*. Greenwich, CT: JAI Press, pp 1-60.
- Bandura, A. (1998) Health promotion from the perspective of social cognitive theory. *Psychology and Health*, 13, pp 623-649.
- Bandura, A. (2001) Social cognitive theory of mass communications. In Bryant, J. & Zillmann, D. (eds.). *Media effects: Advances in theory and research*, 2nd ed. Hillsdale, NJ: Lawrence Erlbaum, pp 121-153.
- Bandura, A. (2004) Health Promotion by Social Cognitive Means. *Health Education & Behavior*, 31, 143-164.
- Boles, R.E., Roberts, M.C., Brown, K.J. & Mayes, S. (2005) Children's Risk Taking Behaviors: The Role of Child-Based Perceptions of Vulnerability and Temperament. *Journal of Pediatric Psychology*, 30, 7, pp562-570.
- Braungart, M.M., Braungart, R.G. (2007) Applying learning theories to healthcare practice. In Bastable S.B., Gramet P., Jacobs & K., Sopczyk, D.L. (eds). *Health professional as educator. Principles of teaching and learning*. Jones & Bartlett Learning, pp 51-90.
- Carroll, W., Augsten, W., Hansbrough, J. & Williams, S. (1986) The Development of a Program for Juvenile Fire Offenders. *The Journal of Burn Care & Rehabilitation*, 7, 3, pp 253-256.
- Cole, R., Crandall, R., Kourofsky, C., Sharp, D., Blaakmann, S. & Cole, E. (2006) *Juvenile Firesetting: A Community Guide to Prevention & Intervention*. Pittsford, New York: Fireproof Children/Prevention First.
- Dadds, M.R. & Fraser, J.A. (2006) Fire interest, fire setting and psychopathology in Australian children: a normative study. *Australian and New Zealand Journal of Psychiatry*, 40, pp 581-586.
- Dietrich, H.F. (1952) Clinical application of the theory of accident prevention in childhood. *American Journal of Public Health*, vol 42, pp 849-855.
- Dolan, M., McEwan, T.E., Doley, R. & Fritzson, K. (2011) Risk factors and risk assessments in juvenile fire-setting. *Psychiatry, Psychology and Law*, 18, 3, pp 378-394.
- Dougherty, J., Pucci, P., Hemmila, M.R., Wahl, W.L., Wang, S.C. & Arbabi, S. (2007) Survey of primary school educators regarding burn-risk behaviors and fire-safety education. *Burns*, 33, pp 472-476.

- Edelman, L.S. (2007) Social and economic factors associated with the risk of burn injury. *Burns*, 33, pp 958-965.
- Evarts, B. (2011) *Children playing with fire, 12/11*. NFPA Fire Analysis and Research, Quincy, MA.
- Farquhar, J.W, Fortmann, S.P., Flora, J.A. & Maccoby, N. (1991) Methods of Communication to Influence Behaviour. In Holland, W.W., Detels, R. & Knox, G. (eds.). *Oxford Textbook of Public Health. Second edition. Volume 2. Methods of Public Health*. Oxford Medical Publications, pp 331 – 344.
- Fessler, D.M.T. (2006) A Burning Desire: Steps Toward an Evolutionary Psychology of Fire Learning. *Journal of Cognition and Culture*, 6.3-4, pp 429-451.
- Grolnick, W.S., Cole, R.E., Laurenitis, L. & Schwartzman, P. (1990) Playing With Fire: A Developmental Assessment of Children's Fire Understanding and Experience. *Journal of Clinical Child Psychology*, 19, 2, pp 128-135.
- Grusec, J.E. (1992) Social Learning Theory and Developmental Psychology: The Legacies of Robert Sears and Albert Bandura. *Developmental Psychology*, 28, 5. Pp776-786.
- Hall Jr., J.R. (2010) *Children playing with fire, 11/10*. NFPA Fire Analysis and Research, Quincy, MA.
- Harpur, A.P., Boyce, K.E. & McConnell, N.C. (2013) An investigation into the circumstances surrounding fatal dwelling fires involving very young children. *Fire Safety Journal*, 61, pp72-82.
- Henderson, J. & MacKay, S. (2009) Retail availability of fire-starting materials and their misuse by children and adolescents. *Fire Safety Journal*, 44, pp 131-134.
- Istre, G.R., McCoy, M., Carlin, D.K. & McClain, J. (2002) Residential fire related deaths and injuries among children: fireplay, smoke alarms, and prevention. *Injury Prevention*, 8, pp 128-132.
- Jennings, C.R. (2013) Social and economic characteristics as determinants of residential fire risk in urban neighborhoods: A review of the literature. *Fire Safety Journal*, 62, A, pp 13-19.
- Kafry, D. (1980) *Fire-Play and Fire-Setting of Young Children*. US Department of Health, Education & Welfare, National Institute of Education.
- Kendrick, D., Coupland, C., Mason-Jones, A.J., Mulvaney, C., Simpson, J., Smith, S., Sutton, A. & Watson, M (2010) Home safety education and provision of safety equipment for injury prevention (review). *Cochrane Database of Systematic Reviews*, issue 7.
- Kolko, D.J. (2001) Efficacy of Cognitive-Behavioral Treatment and Fire Safety Education for Children Who Set Fires: Initial and Follow-up Outcomes. *J. Child Psychol. Psychiat*, 42, 3, pp 359-369.

- Kolko, D.J. (ed.) (2002) *Handbook on Firesetting in Children and Youth*. San Diego: CA, Academic Press.
- McAlister, A.L., Perry, C.L. & Parcel, G.S. (2008) How individuals, environment, and health behaviour interact. Social Cognitive Theory. In Glanz, K., Rimer, B.K. & Viswanath, K. (eds.). *Health behaviour and health education. Theory, research, and practice, 4th ed.* San Francisco: CA, Jossey-Bass, pp 169-188.
- Morrongiello, B.A. (1996) Children's Perspectives on Injury and Close-Call Experiences: Sex Differences in Injury-Outcome Processes. *Journal of Pediatric Psychology, 22, 4*, pp 499-512.
- Morrongiello, B.A., Cusimano, M., Orr, E., Barton, B., Chipman, M., Tyberg, J., Kulkarini, A., Khanlou, N., Masi, R. & Bekele, T. (2008) School-age children's safety attitudes, cognitions, knowledge, and injury experiences: how do these relate to their safety practices? *Injury Prevention, 14*, pp 176-179.
- Morrongiello, B.A., Zdzieborski, D. & Normand, J. (2010) Understanding gender differences in children's risk taking and injury: A comparison of mothers' and fathers' reaction to sons and daughters misbehaving in ways that lead to injury. *Journal of Applied Developmental Psychology, 31*, pp 322-329.
- Putnam, C.T. & Kirkpatrick, J.T. (2005) Juvenile Firesetting: A Research Overview. *Juvenile Justice Bulletin, May*. U.S. Department of Justice.
- Roberts, I. & Power, C. (1996) Does the decline in child injury mortality vary by social class? A comparison of class specific mortality in 1981 and 1991. *BMJ, 313*, pp 784-786.
- Rosenstock, J. M., Strecher, V. J. & Becker, M. H. (1988) Social Learning Theory and the Health Belief Model. *Health Education Quarterly, 15(2)*, pp 175-183.
- Schieber, R. & Vegega, M. (2002) Education versus environmental countermeasures. *Injury Prevention, 8*, pp 10-11.
- Schwebel, D.C. & Plumert, J.M. (1999) Longitudinal and Concurrent Relations among Temperament, Ability Estimation, and Injury Proneness. *Child Development, 70, 3*, pp 700-712.
- Sethi, D. et al. (2008) *European report on child injury prevention*. Copenhagen: World Health Organization Europe.
- Shai, D. & Lupinacci, P. (2003) Fire Fatalities Among Children: An Analysis Across Philadelphia's Census Tracts. *Public Health Reports, 118*, pp 115-126.
- Sharp, D.L., Blaakman, S.W., Cole, E.C. & Cole, R.E. (2006) Evidence-Based Multidisciplinary Strategies for Working With Children Who Set Fires. *Journal of the American Psychiatric Nurses Association, 11*, pp 329-337.

- Zeedyk, M.S., Wallace, L., Carcay, B., Jones, K. & Larter, K. (2001) Children and road safety: increasing knowledge does not improve behaviour. *British Journal of Educational Psychology*, 71 (4), pp 573-594.
- Towner, E.M.L. (1995) The role of health education in childhood injury prevention. *Injury Prevention*, 1, pp 53-58.
- Towner, E. & Warda, H. (1998) Prevention of injuries to children and young people: the way ahead for the UK. *Injury Prevention*, 4, pp 17-25.
- Towner, E. & Scott, I. (2008) Child injuries in context. In Peden, M. et al. (eds.) *World report on child injury prevention*. Geneva: World Health Organization Press Publishing, pp 1-28.
- Warda, L., Tenenbein, M. & Moffatt, M.E.K. (1999) House fire injury prevention update. Part II. A review of the effectiveness of prevention interventions. *Injury Prevention*, 5, pp 217-225.
- Ying, S.Y. & Ho, W.S. (2001) Playing with fire – a significant cause of burn injury in children. *Burns*, 27, pp 39-41.