The Research to Practice Gap in Child Safety: Tools to Promote the Implementation of Evidence-Based Practice in Europe

Beatrice Scholtes

Propositions

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1. Inequalities in child injury rates, within and between countries, demonstrate the opportunity and necessity for good practice to cross borders to successfully reduce child injury rates. (This dissertation)

2. The challenges for child injury prevention, therefore, are less focused upon what to do but rather, *how* to do it. Much evidence has been produced concerning the effectiveness of interventions to protect children. However, persistent inequalities indicate a gap between research and practice. (This dissertation)

3. Child injury has been referred to as a wicked problem requiring inter-sectoral action to address its complexity […] With the contribution of participants from 24 countries, providing 44 cases, across 4 different child injury domains, we identified 27 sectors. (This dissertation)

4. Establishing clarity on the ethical implications of injury prevention activities is particularly important given the multiple sectors involved in its prevention. (This dissertation)

5. By applying the wealth of evidence and thinking from implementation science to injury prevention I believe we stand to make important leaps forward. (This dissertation)

6. Some problems are so complex that you have to be highly intelligent and well informed just to be undecided about them. (Laurence J. Peter)

7. A good solution solves many problems. (Larry Cohen)

8. Wenn dein Mütterlein tritt zur Tür herein, - Und den Kopf ich drehe, ihr entgegen sehe, - Fällt auf ihr Gesicht erst der Blick mir nicht, - Sondern auf die Stelle, näher nach der Schwelle, - Dort, wo würde dein lieb Gesichten sein, - Wenn du freudenhelle trätest mit herein, - Wie sonst, mein Töchterlein. (Gustav Mahler, Kindertotenlieder, Lied 3: Wenn Dein Mütterlein)

   When your dear mother walks in through the door, - and I turn my head to look at her, - my gaze doesn't rest on her at first, - but rather on that place, closer to the threshold, where your sweet face would be, - if, bright with joy, you entered with her, - as you used to do, my dear daughter.

9. Most of the really exciting things we do in our lives scare us to death. They wouldn't be exciting if they didn't. (Roald Dahl: Danny, The Champion of the World)

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Dissertation

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Chapter 1

Introduction

Child Injury

Deaths among children (0-19) due to injury have reduced over the last 30 years. In 1980 the average mortality rate in the European Union (EU) was 23/100,000, by 2012 this had reduced to 6.6/100,000.(1) However, large inequalities in child injury rates between EU countries remain.(2) In 2014 injury mortality rates for 0-19 year-olds ranged from 4/100,000 in Spain to 19/100,000 in Lithuania (see Figure 1.1).(1)

In addition to inequalities between countries there are inequalities within countries.(3) Low national injury rates can mask higher rates at the regional or local level and within pockets of the community. In this sense the well-documented and diverse impact of social inequalities extends to injury risk.(4,5) A 2006 study of England and Wales found that children of unemployed parents had a 13 times higher risk of injury mortality than the most affluent group, for fatal pedestrian injuries the rate was 20 times higher.(6)

The burden of child injury encompasses serious and often long-term consequences for individuals, families and society. For the individual child the physical and psychological effects of injuries include pain and discomfort that can extend into later life. Absence from school can affect social development, academic learning and preparation for future roles, with far-reaching consequences.(7) Families and close friends suffer diverse hardships due to the death or injury of a child including: grief; psychological trauma; increased need for care for the injured child, which in turn can cause further hardship; psychological, social and economic.(8,9)

At the societal level the impact of injury ranges from an increased fear of injury resulting in a decline in activities such as cycling and sport; a decline in neighbourhood cohesiveness due to fear of violence; to society taking on the direct costs of emergency care, treatment and rehabilitation and the loss to society of economically productive life years.(8)

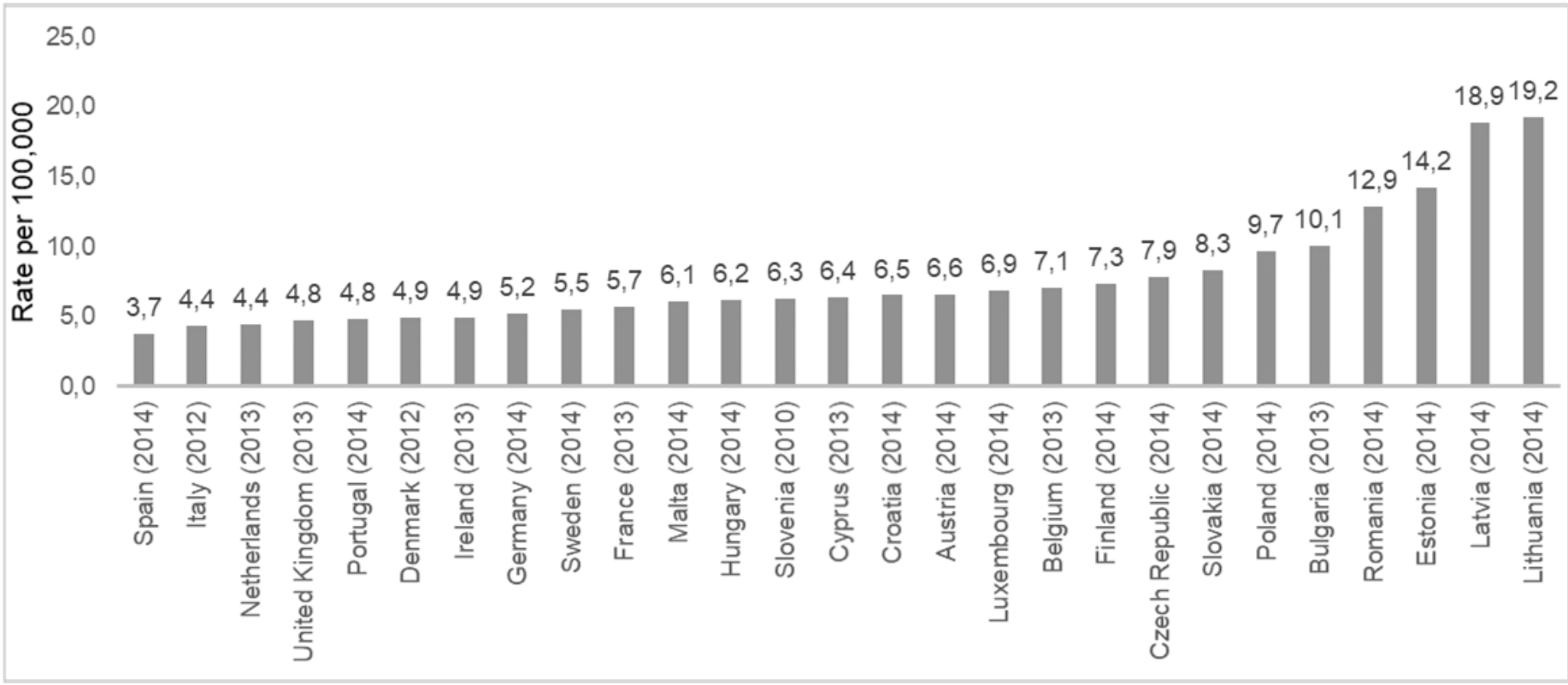

Figure 1.1. Age standardised mortality rates for intentional and unintentional injury, ages 0-19 in European Union member states (1)

Children's participation in environments largely designed for adults, and their physical characteristics such as size and cognitive skills put them at higher risk. Small children are in danger of being hidden from view, such as behind vehicles. Ingestion of even small quantities of poisonous substances can have severe outcomes in children due to their small size. Similarly, smaller airways can exacerbate the consequences of aspiration. Children's cognitive skills also put them at a greater risk of injury. For example, curiosity in younger age groups and the tendency for risk taking behaviours among adolescents.(10)

Children's safety depends upon and is influenced by parents and other significant adults; children are influenced by the safety behaviour their parents demonstrate.(11–14) Additionally, children can be at greater risk due to their parent's experiences as children such as neglect or abuse.(15) Furthermore, parent's level of education, availability of financial resources and presence or absence of social networks can also be risk and protective factors for injury.(9)

The breadth of factors influencing injury risk: hereditary, biological, physical, environmental, socio-economic and political and their interconnectedness make child injury a highly complex issue. Indeed it has been described as a wicked problem.(16–18) Wicked problems, as opposed to tame problems, were first described in the 1970s by Rittel and Webber.(19) Since then the term has evolved.

Roberts divides policy problems into three categories: simple, complex and wicked. Simple problems enjoy consensus on the definition of the problem and how to solve it, such as a broken machine, there is little or no conflict regarding either the problem, or how to solve it. For complex problems consensus is clear on the problem at hand, however, the solution provokes conflict among implicated actors. In wicked problems there is a lack of consensus on the nature of the problem and consequently the solution, this lack of consensus can provoke high levels of conflict among stakeholders.(20) Others have argued that problems can have degrees of wickedness – neither fully wicked, nor completely tame.(21,22)

One could argue that elements of child injury prevention are relatively straightforward. For example, mandating that children's toys pass manufacturing standards to ensure safety and appropriate labelling based on age group. However, other issues such as pedestrian safety, are more complex. Is the problem that children are obliged to walk to school through areas that are not adapted to their safety? That the cars travel too quickly? That children are distracted? That they

haven't had appropriate pedestrian training? That the cars and lorries are not designed to help drivers see small children? Is the solution then that children are driven to school? This would likely be safer, at least for the child in the car, but the secondary effects could be increased exposure to exhaust emissions, increased traffic, lower levels of physical activity, all contributing to existing public health and environmental challenges.

Approaches to address wicked problems, proposed by Roberts, comprise authoritative, competitive and collaborative strategies. The choice of strategy is dependent upon the dispersion of power among the stakeholders. Authoritative strategies can be employed if power is concentrated among a small number of stakeholders – this small group have the power to define the problem and decide on a solution. If power among stakeholders is both dispersed *and* contested, competitive strategies can be used: stakeholders accept a zero-sum game – if the opponent wins the right to define the problem and select the solution the other stakeholders have lost. Finally, if power is dispersed but not contested, collaborative strategies are appropriate. The principle of collaboration is that working as a collective can achieve more than acting alone.(20)

In addition to how stakeholders work together is how they use evidence to inform decision-making. Newman and Head conclude in their 2017 paper that evidence-based analyses cannot, in themselves, be a cure for wicked problems. Increasing or improving the generation and transmission of research to policy makers is not enough, emphasis should be placed on untangling political dynamics and values based discourse.(21) Nevertheless, evidence is vital to effective public health, in the following section I give a general overview of injury prevention interventions.

Approaches to Prevent Child Injury

In general injury prevention approaches can be placed on a continuum between two general groups: active and passive.(23) Passive approaches work constantly, for example, child safety packaging on household chemicals or airbags in cars. The user does not have to make any special effort to 'choose' a safety device or a product with specific safety attributes. Active approaches, on the other hand, require repeated human intervention for example seat belts need to be plugged in and stair gates need to be closed in order to work. However, other interventions can increase the

likelihood of action being taken, such as an alarm sounding if the seat belt is not engaged.

In addition to active and passive approaches, injury prevention interventions can be categorised into the 'three Es' of injury control: engineering, education and enforcement. While these categories can stand alone, in practice they are often used together to address an issue in multiple ways.(24) For example, a media campaign to raise awareness of the dangers of driving while using a mobile phone, launched at the same time as a change in the law increasing penalties, coupled with a greater police presence to enforce the new law.

This combined approach to injury prevention is used to maximise the population impact since different approaches to injury prevention vary in their impact. The Health Impact Pyramid describes the population impact of different types of interventions.(25,26) It demonstrates that addressing socio-economic factors, located at the bottom of the pyramid, can lead to a greater population impact than counselling and education interventions, situated at the top of the pyramid. However, achieving meaningful change to the social and economic determinants of health is a lot more challenging, expensive and politically contentious than 'simpler' educational campaigns. Green and Kreuter, urge caution when using this type of pyramid approach in case it encourages an 'either/or' mentality. They favour an 'and' approach to injury prevention, since, as they see it, the challenge to affect major political change can be helped, little by little, by a more informed population.(27)

International reports conclude that the complexity of child injury risk and protective factors and the multiple settings and stakeholders involved requires delivery of a comprehensive package of approaches, targeting multiple societal groups, via multiple channels.(9,25,26,28–31)

Challenges of Injury Prevention

The challenges for child injury prevention, therefore, are less focused on what to do but rather, *how* to do it. Much evidence has been produced concerning the effectiveness of interventions to protect children.(9,10,28,32,33) However, persistent inequalities indicate a gap between research and practice.(2) The reasons for this are manifold including a lack of resources and capacity in an increasingly challenging environment of competing public health issues. In terms of academic

research there has been limited focus on the implementation *process* of putting injury prevention interventions into practice.(34,35)

Implementation is a process that spans selection of an intervention to its widespread uptake and sustained existence.(36) The growing field of implementation science has contributed enormously to our understanding of the process.(37) However, injury prevention has rarely been the subject of implementation science research.(34)

This dissertation explores the space between research and practice in child safety in Europe, in an effort to elaborate on elements that have received comparatively limited attention. The major themes are: the multi-sectoral nature of child injury prevention; factors affecting selection of an intervention, including ethical concerns; and, the process of adoption, implementation and monitoring of child safety interventions.

Within the dissertation the role of local and regional levels of governance is a particular focus. Children's risk of injury is strongly linked to their local environment and the risks they encounter where they live, play and go to school. While injury prevention action at the European level such as safety standards for toys has a wide impact for some types of injury, other risks need to be addressed at the regional or local level.(38,39)

The process of decentralisation has devolved greater power to sub-national and local level decision makers, the hope being that they are in a better position to act in accordance with the needs of local populations.(40) However, it has been suggested that there is a lack of capacity in terms of expertise for injury prevention at sub-national levels.(41)

The objective of this dissertation, therefore, is to explore elements of the research to practice gap in child injury prevention by working through the process from analysis of the problem to implementation and monitoring of an intervention. The ultimate aim is to produce policy tools and data that could help injury prevention practitioners and policy makers to successfully implement evidence-based interventions.

Conceptual Framework

The focus of this dissertation does not fall easily into a single theoretical framework. The topic can be assessed within theories of governance and implementation science. Naturally, theories of injury prevention are also pertinent to tether the research within the subject matter. The content is therefore situated within a conceptual framework combining public health governance, implementation science and injury prevention (Figure 1.2) in order to shape the research and contextualise the results.

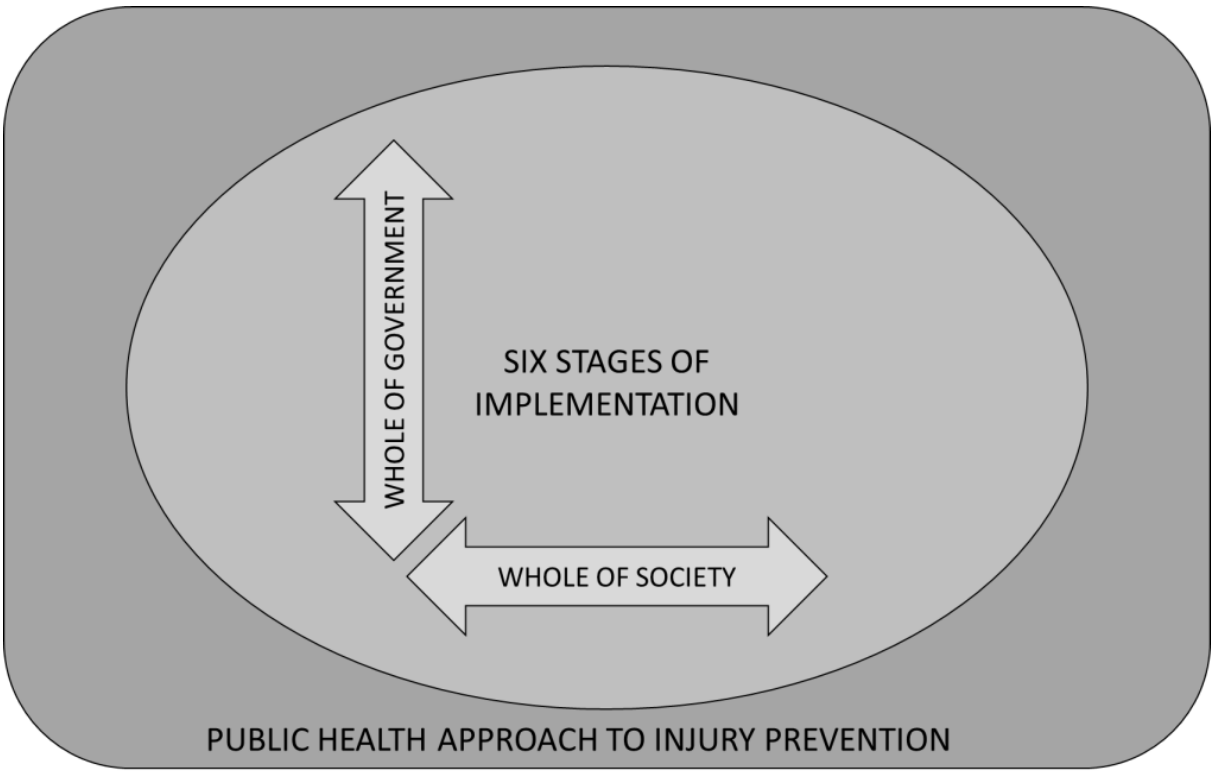

Figure 1.2. Theoretical framework of the dissertation (own concept)

Injury Prevention

The Public Health Approach to Injury Prevention (PHAIP) from Sleet et al. promotes evidence-based solutions to scientifically explored problems.(31) This evidence-driven approach underpins the research presented in this dissertation. The PHAIP describes injury prevention in four stages. First the problem should be effectively examined and defined based on data collection and surveillance. Second, risk and protective factors are identified and explored. The third phase focuses on developing and testing potential interventions. Finally, stage four addresses implementation and dissemination of effective interventions.(31) This dissertation focuses predominantly

on stages three and four of the PHAIP, though the role of evidence-informed work in stages one and two is recognised as integral to the implementation process.

An aspect of the PHAIP that is underdeveloped is an exploration of the different levels of governance (local, regional, national and international) at which the actions described can take place. Additionally the PHAIP does not address stakeholders and the breadth of society implicated in injury prevention (civil society, public and private sectors). Therefore, in addition to the PHAIP this dissertation draws upon the governance for health framework known as the whole-of government and the whole-of society approach to health governance.(42)

Governance for Health

In Europe injury prevention activities occur at each level of government (local to European Union level) and across sectors (public, private and civil society).(9) The whole-of-government and the whole-of-society approaches(42) describe how 'Smart Governance' to address complex problems requires governing by: collaboration; citizen engagement; a mixture of regulation and persuasion; using independent agencies and expert bodies; adaptive policies; resilient structures and foresight. Action to address wicked problems occurs at all levels of governance, across policy sectors, and includes the public and private sector and civil society.(25)

Implementation Theories

Finally, the stages of the implementation process as defined by Fixsen et al. contribute to the theory supporting this dissertation.(36) The six stages of the implementation process span from exploration and adoption to sustainability.

During exploration and adoption the match between community needs and the intervention in question is established and a decision to proceed (or not) is taken. The second phase, 'programme installation', involves active preparation for a different way of working, following the requirements of the evidence-based practice. Initial installation is the phase when fear of change, inertia and investment in the status quo combine with the difficult and complex process of implementing something new. This occurs when the intervention is in its early stages and confidence in the decision to adopt is tested. The fourth phase, full operation, is said to occur when the previous phase has been successfully completed. New ways of working are integrated and the intervention becomes accepted practice. Each attempt to implement an intervention

provides an opportunity to learn more about the intervention and its response and 'fit' to the environmental conditions, this process of adaptation to the environment provides an opportunity to innovate. The final phase of the process is when an intervention is considered sustainable, often requiring 2-4 years. The goal is to assure the long-term survival and continued effectiveness of the intervention within a context of changing environmental factors.(36)

These three frameworks are not used systematically in each chapter, however, they influence the dissertation throughout. The dissertation is built around the premise that: addressing the research to practice gap in child injury prevention and, in turn, addressing inequalities could be achieved by: implementing evidence-based interventions; across all levels of government; involving implicated sectors across the whole of society; whitin working with the rigour of the public health approach to injury prevention.

Context of the Research

Much of the work for this dissertation took place within the framework of the European project entitled: Tools to Address Childhood trauma and Children's safety (TACTICS) which was funded by the European Commission under the Health programme 2008-2013 (Project number 20101212). The project was focussed upon developing policy tools to promote both the uptake of best practice child safety interventions and to promote mutual learning among EU member states. There was a particular focus upon the sub-national level due to the important role of this level of governance for injury prevention. The project was focussed upon four 'domains' of child injury. Unintentional injuries occurring on the road, water, and in the home and intentional injury (self-inflicted and inter-personal violence).

Dissertation Outline

The chapters are organised chronologically according to the process of implementation (Figure 1.3).

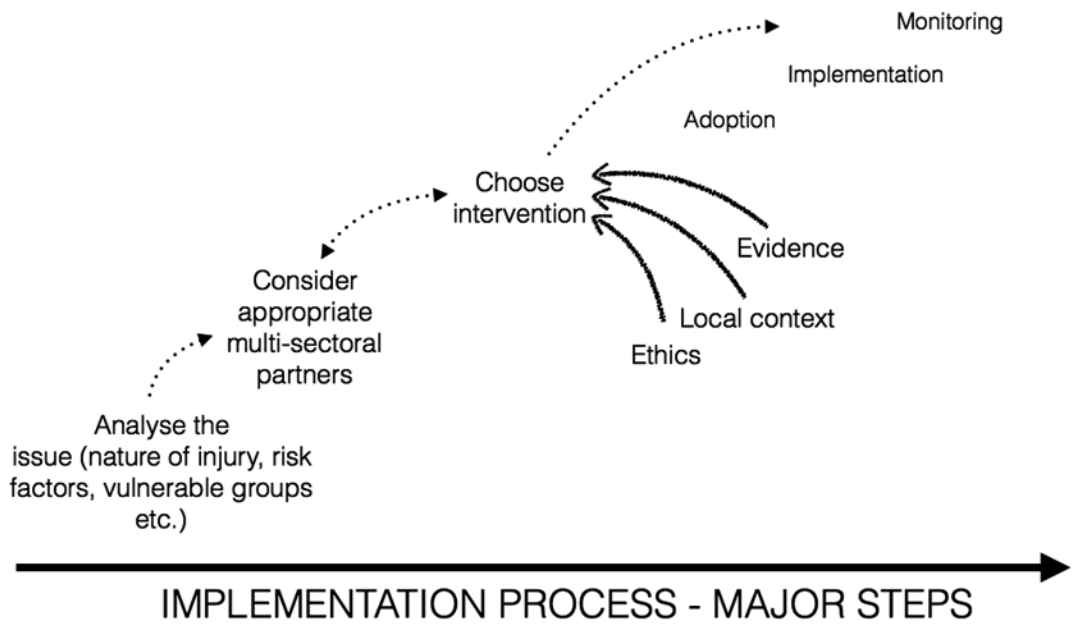

Figure 1.3. Structure of the dissertation

Chapter One is this introduction

Section One - Exploring the Multi-Sectoral Nature of Child Injury Prevention

Chapter Two presents an approach to help public health practitioners, working at the local level, to explore the nature of child injury in their context. The chapter addresses how the cross-cutting nature of child safety could be demonstrated to help policy making at the local level.

Chapter Three explores the different sectors involved in child injury prevention in an exploratory multi-national study. The following research question was posed:

- Which sectors are relevant to each of the four domains of child safety (intentional injury prevention, water, road and home safety)?

Section Two - Selecting an Appropriate Intervention

Chapters Four and Five are focussed upon how to choose an intervention. Chapter Four presents a policy tool aimed at the sub-national level that categorises evidence-based interventions and presents them in a format suitable for rapid appraisal. The research questions posed were:

- What interventions for child safety exist that are evidence based and applicable to the sub-national level?

Chapter Five focuses upon the relevance of public health ethics when selecting and implementing child safety interventions. The chapter explores this issue by applying a public health ethics framework to an intervention to prevent injuries in the home among children under five years old.

Section Three - Putting Interventions into Action

Chapter Six identifies facilitators and barriers to the adoption, implementation and monitoring of child safety interventions. This multi-national qualitative study analysed case studies of child injury prevention interventions from local, regional and national levels of governance in Europe.

Discussion

The discussion reflects upon what this dissertation adds to the challenges for implementation of injury prevention in Europe as well as the limitations of the research. Finally, future perspectives are presented.

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SECTION ONE

EXPLORING THE MULTI-SECTORAL NATURE OF CHILD INJURY PREVENTION

Chapter 2

A practical tool to assess the cross cutting nature of child injury prevention as a basis for policy making at the local level

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Abstract

Background

Risk factors for child injury are multi-faceted. Social, environmental and economic factors place responsibility for prevention upon many stakeholders across traditional domains such as health, justice, environment and education. Multi-sectoral collaboration for injury prevention is thus essential. In addition, co-benefits for other sectors exist. However, multi-sectoral collaboration is often difficult to establish and maintain. We present a model for practitioners and policy makers at the local level to explore and address the multi-sectoral nature of child injury.

Methods

We combined elements of the Haddon Matrix and the Lens and Telescope model, to develop a new tool for use by practitioners and policy makers at the local level.

Results

This tool offers the opportunity for practitioners and policy makers at the local level, from diverse sectors, to work together to identify their role in child injury prevention. Based on ecological injury prevention and life-course epidemiology it encourages multi-disciplinary team building from the outset. The process has three phases: first, visualise the multi-sectoral responsibilities for child injury prevention in the local area; second, demonstrate the need for multi-sectoral collaboration and help plan prevention activities together; and third, visualise potential co-benefits to other sectors and age groups arising from child injury prevention initiatives.

Conclusion

The tool encourages inter-sectoral collaboration for child injury prevention at the local level. This tool is considered to be a useful addition for child injury prevention at the local level. However testing the practicality of the tool in a real-world setting would improve it further.

Introduction

It is far from trivial to reiterate how devastating child injury is to the individual, family and society. Among the measurable costs, are loss of life, long and short-term disability, psychological consequences, and financial costs.(1) In addition, child injury remains the leading cause of death and a major cause of disability for children aged 5–19 in the European Region.(2) Despite this varied and heavy burden, funding for prevention is comparatively low(3), and capacity and leadership resources, in terms of adequate numbers of personnel and availability of the relevant skills set, are limited.(4)

The determinants of child injury are multiple, broad, and not limited to the health sector.(2,5) Thus, in order to efficiently direct and fund child injury prevention, one must account for the cross-cutting, multi-sectoral determinants that result from a complex interplay between human factors and those in the physical and socio-cultural environments.

Since the multiple determinants of child injury cannot be addressed by the health sector alone, a whole-of-government approach is required—vertically, from international politics to local decision makers, and horizontally, across policy fields such as health, transport, housing, justice and education. Preventive action must also work across society, employing a whole-of-society approach engaging actors and stakeholders within government, civil society, research institutes and the private sector.(2,6)

Though inter-sectoral co-operation is essential, it is notoriously challenging.(7,8) It is often difficult to engage relevant stakeholders and maintain their co-operation throughout the process from policy making through to implementation and evaluation. Additionally, the complexity of government systems, where roles and responsibilities are divided into traditional silos (e.g., health, transport, education), and where responsibility and power are split between national, regional and local levels, can further hinder cooperation.(9) Thus, due to its complexity, child injury is one of the so-called ‘wicked’ problems of public health.(7) However, its cross-cutting nature offers broad scope for multi-sectoral co-benefits.(10)

In this paper we focus on the role of regional or local level decision makers and propose a model to facilitate the decision making process for the cross cutting issue of child injury prevention.

Existing models for injury prevention

Several models to guide injury prevention have been proposed, including those addressing the multiple determinants of injury(11,12) intervention planning(13,14) and inter-sectoral collaboration.(15) These models provide useful theoretical frameworks to address injuries and their prevention. However, they do not address the specific nature of child injury and in some cases may be challenging for use at the local level.

Child injury prevention requires specific, directed attention. Children participate in environments largely designed for adults where their physical and cognitive characteristics make them more vulnerable to injury. Physical and cognitive developmental stages precipitate different periods of injury susceptibility. Age is therefore an important factor in child injury prevention and models used must have the flexibility to address this heterogeneous group. Children are also highly dependent upon the care and protection of adults, so factors affecting an adult's capacity to supervise children can directly affect them.(16,17) General injury prevention initiatives, designed for adults, do not always protect children to the same extent.(18,19)

In terms of governance for child injury prevention, a lack of leadership and capacity at the national level such as dedicated government departments or ministries or, a lack of a specific focal point within key departments for child safety has been identified.(20) It is likely that if this is the situation at the national level that there is an even greater lack of capacity at the regional or local level where much decision making for health lies.(21)

To our knowledge, no existing model or tool adequately addresses child injury, while simultaneously providing a practical, multi-sectoral tool for practitioners and policy makers at the local level. In order to adequately assess the specificities of child injury and its cross-cutting nature, as well as incorporate the potential co-benefits into prevention planning, practitioners and policy makers should be able to:

- Examine the issue and visualise the multi-sectoral responsibilities for child injury prevention in the local area
- Demonstrate the need for inter-sectoral collaboration and collective planning of prevention activities

- Identify the scope for co-benefits for other sectors, age groups or health issues arising from child injury prevention initiatives

In this paper we propose a model based upon aspects of the Haddon Matrix(22) and the Lens and Telescope model(23) providing a practical tool and process to meet these requirements for the local level.

The local level child injury prevention assessment tool

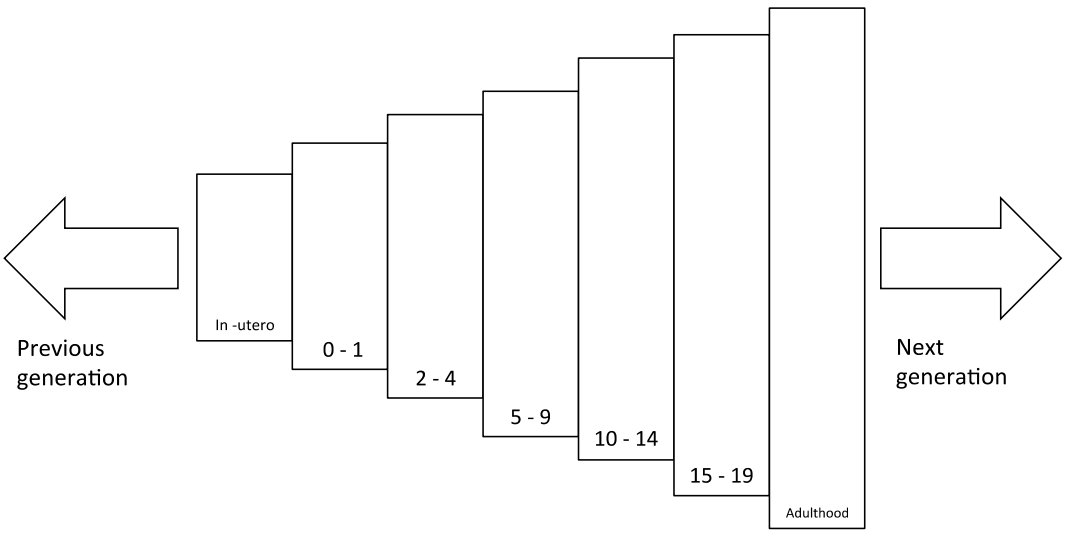
The traditional Haddon matrix depicts a time element in the first dimension (vertical axis), dividing factors associated with what Haddon termed the pre-event, event and post-event phases of an injury event. In the second dimension (horizontal axis), of the simplest form of the matrix, are the three vertices of the epidemiological triangle the host (human), the agent (vehicle/vector) and the environment, with environment often divided into social and physical. The Haddon matrix fits well into the traditional public health approach of primary, secondary and tertiary prevention and has been used to explore a variety of aspects of the public health process for injury prevention including assessing risk factors(5,24), identifying preventive strategies and assisting the decision making process(13) and for public health readiness and planning.(25,26)

The traditional, nine cell, Haddon Matrix maybe less suitable for child injury prevention due to the separation between environment, host and agent. Children's dependence upon adult supervision to secure their environment and their lack of control over the environment is difficult to capture in this version of the Haddon Matrix. Therefore, when developing our tool, we sub-divided the columns, host and agent into factors for human, social and physical environment. This allows the table to capture more detail that maybe particularly relevant for preventing child injury such as factors affecting parental supervision.

The temporal element of injury prevention is well represented in the Haddon Matrix, however circumstances preceding the injury are limited to the pre-event phase. This makes it difficult to differentiate between long standing risk factors such as socio-economic status, and short-term factors such as bad lighting. A further reality of child injury is that the determinants of injury change with age. The inclusion of the life course approach developed in the Lens and Telescope model(23) is intended to provide a visual cue regarding the needs of the different age groups, encouraging one to think of enduring injury determinants such as socio-economic status and parental factors.

The life course aspect of our tool is divided into five specific age groups relevant to child injury, 0-1, 2-4, 5-9, 10-14, and 15-19; with general phases for the foetal phase, adulthood, previous and the next generation. The slices representing age get smaller towards the foetal stage, to illustrate a focus on the roots of the problem, and larger towards older age groups to illustrate the breadth of influence preventive measures could have.

The resulting tool (Figure 2.1) can be used to examine a specific injury event (e.g., a specific car - pedestrian collision) or a group of injuries (e.g. child pedestrian injuries). Further, in order to include and examine all relevant factors, the matrix (or matrices, if a separate matrix is needed) should be completed with factors relevant to each affected person in the injury event. For example, in the case of a car – pedestrian collision, a matrix should be completed accommodating the perspectives of the injured child, the driver, passengers in the car and any other relevant people.



Age group	Host			Agent		
	Human	Social environment	Physical environment	Human	Social environment	Physical environment
Pre-event						
Event						
Post-event						

Figure 2.1. Local level child injury prevention assessment tool

Using the local level child injury prevention assessment tool

This tool is intended for use by practitioners and policy makers at the local or regional level. It can be used in three ways: first, to examine and visualise the multi-sectoral responsibilities for child injury prevention in the local area; second, to demonstrate the need for multi-sectoral collaboration and collective planning of prevention activities and third to identify the scope for co-benefits for other sectors, age groups or health issues arising from child injury prevention initiatives.

Phase one – examining the issue and visualising multi-sectoral responsibilities

The tool is designed for use in a collaborative setting from the beginning. Relevant partners and stakeholders from multiple sectors should contribute throughout the process to map each of the factors that contributed (or could have contributed) to the injury event for each person involved in the injury. In line with concepts of life-course epidemiology, the factors should not be confined to the moment the injury occurred but should also include pre-existing factors. The process of eliciting each of these factors aims first, to draw all of the stakeholders together to come to a common understanding of the problem and potential solutions(7) and second, to identify the many sectors implicated within child injury prevention.

Phase two - Demonstrating the need for multi-sectoral cooperation

Factors identified in the injury analysis should be examined including the identification of sectors implicated in prevention. Users can then propose evidence based interventions and policies that address these factors and identify the appropriate sectors that would need to be involved.

The life course approach serves as a prompt to ensure age is being taken into consideration as interventions are considered. Potential interventions could be inserted into an empty matrix in the same way as the factors were placed in phase one.

Phase three – Visualising the scope for co-benefits

The third use is to help identify potential co-benefits of child injury prevention strategies for other age-groups and issues within and outside the health domain. Co-benefits can be achieved as a result of child injury prevention measures in three ways. First are the physical, economic and societal benefits for the child, family and

community as a result of a reduction in intentional and unintentional injury.(1,3) Second are co-benefits arising as a result of injury prevention initiatives for the target population or other groups (e.g. the health benefits of swimming lessons); these are not dependent upon a reduction in injury incidence but are derived from the intervention itself. Third are co-benefits for other groups that can be achieved as a part of the process of implementation of injury prevention strategies (e.g. providing training and employment to distributers of safety equipment).

By reflecting on the age group segments of the tool, users are encouraged to consider the impact on other age-groups and identify which groups might directly and indirectly benefit from child injury prevention interventions and elaborate on these co-benefits. For example, an intervention to improve the walkability of an area surrounding a school would directly benefit age groups 5-9, 10-14 and 15-19 years, but may also benefit the elderly population of that area by providing a safer walking environment.

Discussion

Much responsibility for injury prevention lies with local practitioners and policy makers in terms of choice of intervention and process of implementation. However, for complex 'wicked' problems such as child injury, the key stakeholders at the local level are often unaware of their responsibilities for public health and the potential impact of their participation.(27) Local government officials have been found to lack awareness of the link between health and non-health sectors, and their experience of multi-sectoral collaboration is often limited.(8) A key determinant of success for multi-sectoral collaboration, is the development of a multi-disciplinary team of multiple stakeholders(28,29) to first reach a common understanding of the problem and then, on that basis, to collaboratively design evidence based intervention that are specific and relevant to the needs of the target population.(7)

A significant difference between our tool and existing tools for child injury prevention is its interactive and collaborative nature. It has been designed to provide a comprehensive approach to child injury prevention in a simple format to maximise output at the local level of governance. The tool provides a practical framework to engage diverse stakeholders from the outset. The exercise of mapping factors, using a matrix that addresses the specific physical and social environments for host and agent separately, helps identify the potential involvement for many sectors and the

identification of roles and responsibilities as interventions are selected. A limitation of this approach is that the tool is unable to quantify the comparative or cumulative impact of the identified risk factors in the local setting. Local knowledge of their relative importance in the target setting is therefore required to weight them appropriately, in terms of importance and prevalence, and to develop a suitable intervention. Additionally, the tool does not help researchers identify what interventions or policies are already in place or how to choose an intervention. However the third dimension of the Haddon Matrix as proposed by Runyan(13) could be used in conjunction with this model to aid intervention choice.

The opportunity offered with this tool, to identify the potential co-benefits of injury prevention initiatives, is particularly important in the context of advocacy and to secure funds for prevention activities. A lack of funding is a common barrier to adoption and implementation of public health interventions, particularly for complex or wicked problems.(8) If co-benefits of prevention activities outside the target group or health domain can be demonstrated, the chances of securing funding may be higher, particularly if the co-benefit addresses a priority area (e.g. obesity or healthy ageing). This tool provides a way of demonstrating the interconnectivity between sectors and therefore the secondary impact child injury prevention strategies may have beyond childhood or outside the injury domain. However, when identifying co-benefits this approach does not offer any economical or health benefit quantification should such a strategy be implemented.

The use of a life course approach is a central element of our tool. There are several advantages to this approach: first, it emphasises the importance of a child's age for injury susceptibility and acts as a lens through which to consider relevant factors, particularly when looking at an overall injury issue (e.g. child drowning); second, it accommodates age in the design or choice of preventive interventions; third, it allows analysis of risk factors related to parents or carers and underlying causes; and, fourth, it provides a frame to reflect upon potential co-benefits for other age groups arising from child injury prevention interventions.

Challenges in child injury prevention include possible long timeframes between intervention implementation and results, especially when addressing the more complex risk factors such as substance abuse and mental health. These are often incompatible with the short-term pressures on policy makers.(30) Visualisation of co-

benefits using a life-course approach could provide policy makers with solid arguments for the implementation of such interventions.

Conclusion

This tool, based on a model combining Haddon's matrix with a life course approach to injury prevention facilitates stakeholders in identifying risk factors across policy sectors. When done collectively, engaging multiple stakeholders, it should result in a better understanding of the multi-sectoral nature of child injury prevention and the potential roles and responsibilities for the stakeholders in the local area. This, in turn, should assist in the planning of tailored multi-sectoral child injury prevention activities. Further the broadened frame helps identify potential co-benefits across sectors, within and outside the injury domain, which may assist in gaining support for child injury prevention.

This tool has been designed to provide a practical and user-friendly methodology to address the inter-sectoral issue of child injury prevention at the local level. However it is yet to be tested in a real world setting and a study of its efficiency would be a useful addition to this research.

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Chapter 3

Multi-sectoral action for child safety – a European study exploring implicated sectors

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Abstract

Background

Injury to children in Europe, resulting in both death and disability, constitutes a significant burden on individuals, families and society. Inequalities between high and low income countries are growing. The World Health Organisation Health 2020 strategy calls for inter-sectoral collaboration to address injury in Europe and advocates the whole of government and whole of society approaches to wicked problems. In this study we explore which sectors (e.g., health, transport, education) are relevant for four domains of child safety (intentional injury, water, road and home safety).

Methods

We used the organigraph methodology, originally developed to demonstrate how organisations work, to describe the governance of child safety interventions. Members of the European Child Safety Alliance, working in the field of child safety in 24 European countries, drew organigraphs of evidence-based interventions. They included the different actors involved and the processes between them. We analysed the organigraphs by counting the actors presented and categorising them into sectors using a pre-defined analysis framework.

Results

We received 44 organigraphs from participants in 24 countries. Twenty-seven sectors were identified across the four domains. Nine of the 27 identified sectors were classified as 'core sectors' (education, health, home affairs, justice, media, recreation, research and social/welfare services, consumers).

Conclusion

This study reveals the multi-sectoral nature of child safety in practice. It provides information for stakeholders working in child safety to help them implement inter-sectoral child safety interventions taking a whole-of-government and whole-of-society approach to health governance.

Keywords: Injury and wounds, paediatrics, cooperative behaviour, policy making

Introduction

Death or serious injury of a child from a preventable injury incident is a tragedy. Beyond the tragic loss of life, the burden extends from the individual to family, friends, community and society in general. Consequences include physical and mental discomfort and distress (e.g., pain, grief), direct and indirect financial costs, (e.g, medical costs, loss of productivity) and social impacts (e.g., increased fear of injuries).(1)

Within Europe in 2013 injury mortality rates for 0-19 year olds ranged from 4/100,000 in Spain to 17/100,000 in Lithuania.(2) However, mortality rates represent only a fraction of the problem. Estimates suggest that for each child death there are 129 hospital admissions, 1635 visits to emergency departments and an unknown number of visits to general practitioners representing sizeable healthcare costs.(3) Between 2000 and 2011 injury related deaths among children (0-14) decreased by 44% in the WHO region. However relative inequalities between high and low-income countries have widened; the mortality rate ratio between the two groups of countries increased by 31%, from 4.3/100,000 in 2000 to 5.6/100,000 in 2011.(4) Decreasing rates suggest that efforts to prevent these injuries are having a positive effect.(5) The challenge now is to implement proven interventions effectively and more widely, particularly in low-income countries.(4)

Child injury is described as a 'wicked' problem(6) due to its complexity, multi-faceted, and multi-levelled nature.(7, 8) It is generally agreed that collaboration among stakeholders whose power is dispersed is required to effectively address wicked problems.(9) Additionally, the governance for health in the 21st century approach proposes engaging stakeholders horizontally, across the whole of society (public sector, private sector and civil society) and vertically across the whole of government (local, sub-national, national, international).(10, 11) This approach is also echoed in the United Nations sustainable development goal 17 'strengthen the means of implementation and revitalize the global partnership for sustainable development'.(12)

The WHO Health 2020 strategy states that the challenge for injury prevention lies in ensuring that responses to injury are placed high on the agenda of policy makers and practitioners from the health sector and other sectors (e.g., transport, education) to ensure action:

"*Preventing injury and violence is multi-sectoral, and governance mechanisms are needed for the health sector to engage with other sectors that are critical as partners in prevention, such as those responsible for justice, transport, education, finance and social welfare."*(13)

However, despite awareness of the need to act across sectors,(14-16) and international calls to do so; most notably by the WHO Regional committee for Europe resolution EUR/RC55/R9(17), the European Council Recommendation 2007/C164/01(18), the WHO Health 2020 Strategy(13) and The Minsk Declaration(19) action is not occurring consistently nor uniformly across the region. This is exemplified by the increase in inequalities observed by Gopfert et al.(4)

The reality is that inter-sectoral collaboration is difficult.(20) Factors that can hinder progress include challenges forging initial joint agreements and building trust, leadership and legitimacy across diverse sectors.(21) A first step for effective inter-sectoral collaboration is to identify a need to work together – knowing whom your partners should be, in which sectors and at what level they can be found.(11, 22)

General attempts have been made to identify the sectors implicated in child safety.(14-17) However, we could not find any systematic analysis of which sectors actually participate in child safety interventions.

In this study, we explored which sectors (e.g., health, transport, education) are implicated in child safety. Our research questions were: Which sectors are relevant to each of the four domains in child safety (intentional injury prevention, water, road and home safety)? Which sectors had the most actors attributed to them? Which sectors are relevant across the four domains examined?

Methods

The methods used in this study built upon an existing methodology developed by Mintzberg and Van der Heyden known as 'organigraphs'.(23) Organigraphs were developed to demonstrate *how* an organisation works, as opposed to simply drawing its structure. Instead, these more complex visualisations depict both the interactions and the nature of those interactions between people, products, and information. In this study we used organigraphs to examine child safety. Each organigraph focussed upon an intervention showing which actors were involved, the nature of their involvement and at which level of governance they operated.

In a departure from the original methodology our method involves arranging shapes (representing actors) and connectors, (representing processes) onto a multi-level grid (representing four levels of governance: international, national, sub-national and local levels) to build a picture of the processes behind child safety interventions. Our decision to impose a minimum structure to the organigraphs by using the four-level grid was to reflect principles of a whole-of-government approach.(10) The shapes and connectors were pre-defined, tested and mutually agreed upon by partners of the project in the testing phase before the study started.

The study was part of the European project TACTICS (Tools to Address Childhood Trauma, Injury and Children's Safety),(24) which was focussed on four domains of child safety; road, water and home safety and intentional injury prevention. These domains were chosen because they reflected the major causes of injury mortality.

Participants in the study were partners on the TACTICS project. They were practitioners working in the field of child safety in 24 countries in the WHO European Region who were also members of the European Child Safety Alliance. The participants were categorised into two groups that reflected the administrative and financial structure of the project and the role of the participants in other work packages. The first group (n=6) was asked to draw four organigraphs each, an intervention for each domain of child safety in the study. The second group (n=18) was asked to draw one organigraph each, for an intervention in a single domain of child safety. In addition, a European, Brussels based NGO (The European Public Health Alliance), was asked to draw an organigraph for each of the four child injury domains from the European perspective, focusing on the European level.

The child safety interventions depicted in the organigraphs were systematically selected to ensure maximum coverage of injury issues and child age groups, and to broadly cover the different governance levels of implementation. One of the authors (MM) developed a matrix combining injury domain, target age group and the governance level of the intervention. The matrix was reviewed by the TACTICS scientific committee and used to select the interventions included in the study. Participants were asked to submit good-practice interventions from their countries (good-practice as defined in the ECSA Child Safety Good Practice Guide).(25) Three of the authors (MM, JV and BS) made the final selection of interventions.

Participants drew their organigraphs in Microsoft PowerPoint® using a centrally issued template, pre-defined shapes and connectors (see Figure 3.1) and pre-tested author instructions. The author instructions asked participants to consider three questions when drawing their organigraph: 1, which institutions/actors were involved in the adoption, development, implementation, enforcement (as appropriate) and monitoring of the chosen intervention? 2, how do these institutions/actors relate to each other? 3, which EU directives and/or national laws regulate or necessitated setting up the intervention? And which organisation are involved?

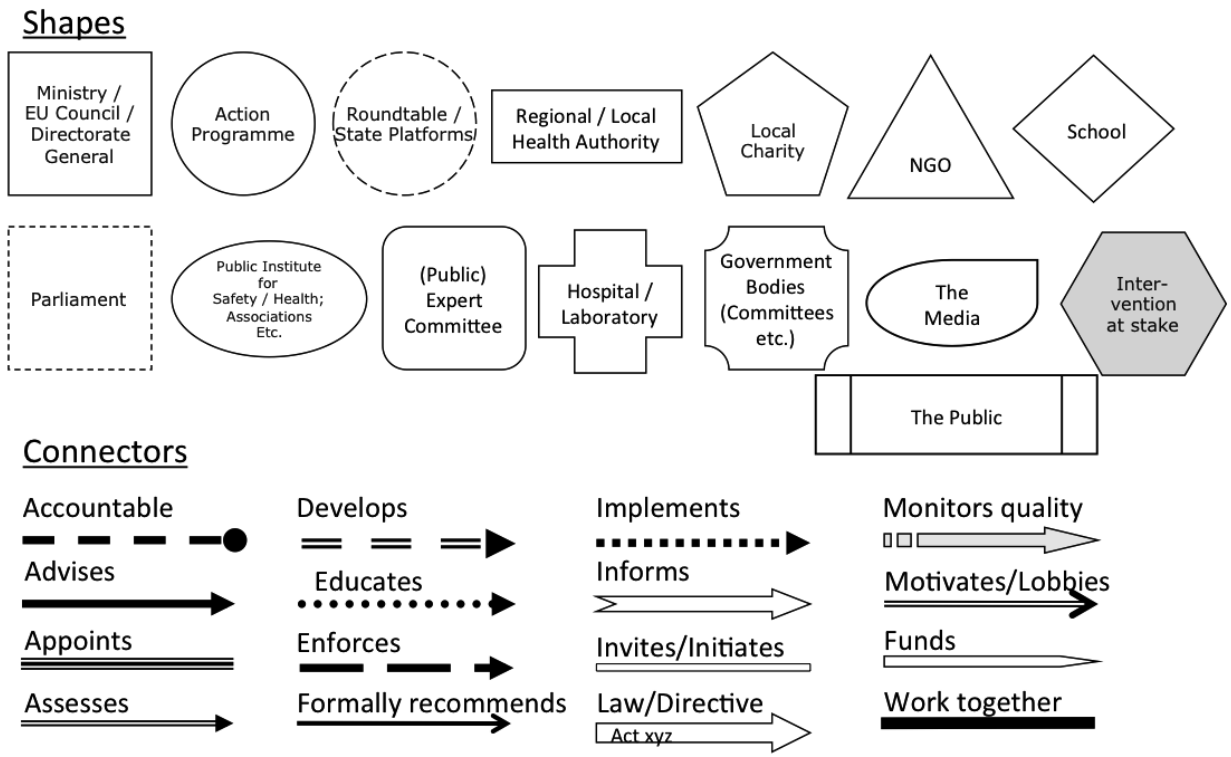

Figure 3.1. The meanings of connectors and shapes used in the organigraphs.

The author instructions encouraged participants to draw the organigraph collaboratively, in teams of people who were (or are) involved in implementing the intervention described. If this was not possible, they were asked do the necessary research to ensure that the organigraph was as accurate as possible.

All the participants in this study were signed partners on the TACTICS project. They all signed the TACTICS project agreement and self-governance rules in which aspects of publication and use of data were laid out. Both documents provided detailed information on the nature of the study thus no further ethical approval was sought.

Analysis Framework

Our research questions required categorisation of the actors depicted in the organigraphs into sectors that would be relevant in an international context. In order to do this we required a generic (internationally applicable) list of sectors to work as an initial framework for analysis. We were not able to find such a list in either academic or grey literature. Therefore, we developed an analysis framework by first conducting a preliminary exploration of the organigraphs which was then supplemented by three articles (26-28) and a list of directorate generals of the EU. (29) The final analysis framework used for the study is the combined result of the sectors identified during these two steps (see Table 3.1).

Table 3.1. Analysis framework: List of sectors applicable to child injury prevention

Sector name	Sub-sectors included within each sector
Advocacy	Advocacy organisations
Agriculture	Agriculture policy
Communications	Telecom, internet, IT, web security
Community Development	Community and neighbourhood organisations, economic development (infrastructure, rural development programmes), town planning
Consumers	Consumer affairs, manufacturing standards, consumer protection
Culture	Visual arts, performing arts, literature, museums, galleries
Defence	Armed forces, military, navy, air force
Education	Primary, secondary, tertiary education, vocational training, adult and continuing education, driving instruction
Emergency services	Ambulance, fire service, coast guard, life guard, lifeboats
Employment	Employment legislation, health and safety at work
Environment	Environmental preservation, pollution control and prevention, natural resource conservation, environmental preservation, parks, open spaces
Finance	Taxation, economic policy

Table 3.1. (continued) Analysis framework: List of sectors applicable to child injury prevention

Sector name	Sub-sectors included within each sector
Food and drink industry	Restaurants, bars, cafés
Health	Primary, secondary and tertiary care, rehabilitation, mental health, crisis intervention (includes suicide prevention), public health, patient organisations
Home Affairs	Internal security, immigration/asylum, border enforcement
Housing	Construction, management, architecture
Insurance	Health insurance, care insurance
Justice	Police, legal services, court-related matters, crime prevention and public safety, rehabilitation of offenders, victim support
Maritime affairs	Fisheries, maritime policy
Media	Production and dissemination of information: Television, newspapers, magazines, radio
Philanthropic organisations	Non-subject specific grant making, foundations, fund-raising organisations e.g., lotteries
Recreation	Sport, playgrounds
Religion	Religious organisations
Research	Universities, research institutes
Social/welfare services	Social security, child welfare, child services, day-care, youth services, youth welfare, (youth clubs, delinquency/drop out prevention) family services (parenting courses, family violence shelter), services for disabled, services for elderly, children's ombudsman
Tourism	Tourism policy
Trade policy and regulations	Policies and regulation governing international trade
Transport	Mobility, road, rail, air, water, urban mobility, road safety

Analysis

Two researchers, working together, divided the organigraphs into the four injury domains and counted and categorised each actor depicted, into sectors based on the analysis framework (Table 3.1). In an attempt to quantify the 'importance' of a sector we also noted how many actors were categorised to each sector. In the final stage of analysis we grouped the data for each of the four domains and four of the authors assessed which sectors were relevant across all four injury domains to establish a group of sectors we termed 'core sectors'.

Results

We received 44 organigraphs (Figure 3.2 provides an example of an organigraph) from 24 countries; nine for intentional injury prevention, nine for water safety, 12 for road safety and 14 for home safety. The distribution of actors over the four governance levels were: 11.3% of actors located at European level, 55.5% at national level, 17.5% at sub-national level and 16% at local level. Using the analysis framework we identified 27 different sectors across the four domains of child injury prevention (see Table 3.2).

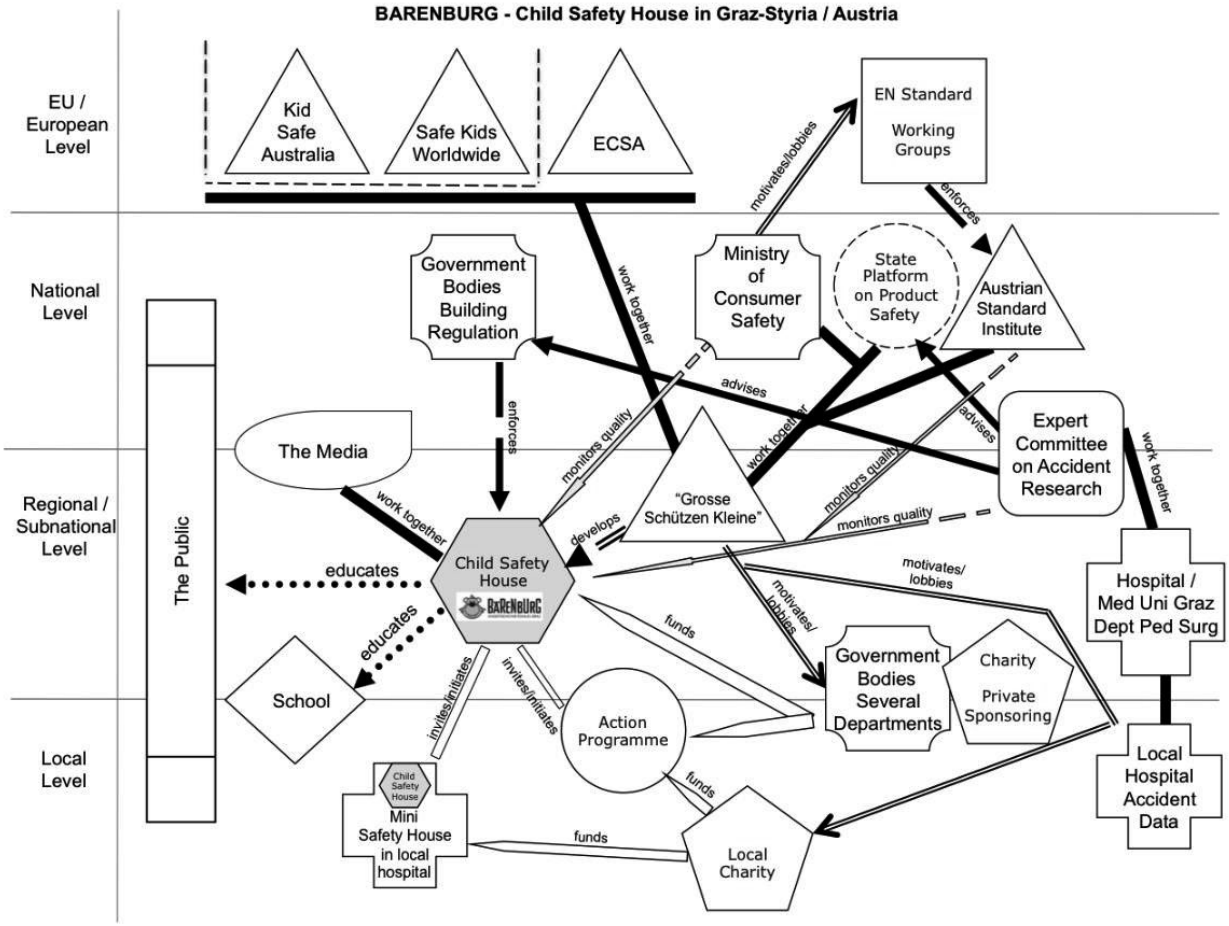

Figure 3.2. An example of an organigraph from Austria: Barenburg – Child Safety House in Graz-Styria Austria.

Table 3.2. Frequency (and proportion) of actors per sector by child safety domain

Sectors	Intentional injury prevention	Water safety	Road safety	Home safety	Total
Advocacy			1 (0.6%)		1 (0.2%)
Agriculture		1 (0.8%)			1 (0.2%)
Communications	5 (4.4%)	1 (0.8%)	1 (0.6%)		7 (1.2%)
Community development		1 (0.8%)	2 (1.2%)	3 (1.8%)	6 (1.0%)
Consumers		10 (8.0%)	10 (5.8%)	13 (7.8%)	33 (5.7%)
Culture	1 (0.9%)	1 (0.8%)	1 (0.6%)		3 (0.5%)

Table 3.2. (continued) Frequency (and proportion) of actors per sector by child safety domain

Sectors	Intentional injury prevention	Water safety	Road safety	Home safety	Total
Education	10 (8.8%)	9 (7.2%)	13 (7.6%)	7 (4.2%)	39 (6.8%)
Emergency services		16 (12.8%)		3 (1.8%)	19 (3.3%)
Employment	1 (0.9%)			3 (1.8%)	4 (0.7%)
Environment		6 (4.8%)	1 (0.6%)	3 (1.8%)	10 (1.7%)
Finance			3 (1.7%)		3 (0.5%)
Food and drink	1 (0.9%)	1 (0.8%)			2 (0.3%)
Health	34 (30.1%)	33 (26.4%)	27 (15.7%)	70 (42.2%)	164 (28.5%)
Home Affairs	4 (3.5%)	3 (2.4%)	8 (4.7%)	3 (1.8%)	18 (3.1%)
Housing		1 (0.8%)	2 (1.2%)	6 (3.6%)	9 (1.6%)
Insurance		1 (0.8%)	2 (1.2%)		3 (0.5%)
Justice	16 (14.2%)	2 (1.6%)	12 (7.0%)	4 (2.4%)	34 (5.9%)
Maritime affairs		13 (10.4%)			13 (2.3%)
Media	9 (8.0%)	4 (3.2%)	17 (9.9%)	16 (9.6%)	46 (8.0%)
Philanthropic organisations		2 (1.6%)	1 (0.6%)	5 (3.0%)	8 (1.4%)
Recreation	2 (1.8%)	8 (6.4%)	4 (2.3%)	3 (1.8%)	17 (3.0%)
Religion	1 (0.9%)				1 (0.2%)
Research	7 (6.2%)	3 (2.4%)	10 (5.8%)	5 (3.0%)	25 (4.3%)
Social/welfare services	22 (19.5%)	2 (1.6%)	6 (3.5%)	16 (9.6%)	46 (8.0%)
Tourism		1 (0.8%)	2 (1.2%)		3 (0.5%)
Trade		4 (3.2%)	2 (1.2%)	6 (3.6%)	12 (2.1%)
Transport		2 (1.6%)	47 (27.3%)		49 (8.5%)
Total	113	125	172	166	576

Sectors by injury domain

For the domain of intentional injury prevention we identified 13 different sectors (% represents the proportion of total actors depicted in the organigraphs and categorised to that sector): health (30%), social/welfare services (19%), justice (14%), education (9%), media (8%), research (6%), home affairs (4%) and recreation (2%). The remaining sectors (accounting for 8% of the actors) included; communications, culture, religion, employment and the food and drink industry sectors. Social/welfare services and justice had the highest representation in intentional injury prevention compared to the other injury domains. Combined with health these three sectors accounted for 63% of actors.

Within the water safety domain 23 sectors were identified. The health sector had the most actors attributed to it, accounting for 26% of actors, followed by emergency services (13%), maritime affairs (10%), consumers (8%), education (7%), recreation (6%) and environment (5%).

For the road safety domain 21 sectors were identified. In contrast to the other domains where the health sector had the highest proportion of actors, transport (27%) appeared most frequently, followed by health (16%), media (10%), education (8%), justice (7%), research (6%), consumers (6%) and home affairs (5%).

The role of the health sector was prominent in home safety, accounting for 42% of actors involved. After health, media (10%), social/welfare services (10%) and consumers (8%) had the highest proportions of actors attributed to them, followed by housing and trade (4% each).

Looking at the four injury domains together, the health sector had the highest number of actors attributed to it (28.5%), followed by transport (9%), social/welfare services (8%), media (8%), education (7%) justice (6%) and consumers (6%). The number of actors attributed to the sectors varied depending upon the injury domain in question. The health sector was the most significant in intentional injury prevention, water and home safety, the transport sector had the most actors attributed to it in the road safety domain.

Core-Sectors

Within the 27 sectors identified we found that eight sectors (education, health, home affairs, justice, media, recreation, research and social/welfare services) appeared in all four injury domains examined. Consumers was in the top six sectors (in terms of number of actors categorised to it) of three of the four domains (water, road and home safety) and accounted for 6% of actors overall. Therefore, we judged that it was sufficiently relevant to be included in the core sectors.

The frequency of the core sectors, compared to the other sectors varied between injury domains. In intentional injury prevention the core sectors accounted for 92% of actors, in home safety the proportion was 83% and in road and water safety it was 62% and 59%, respectively.

Discussion

This study explored the sectors implicated in child safety overall and for each of the four child safety domains included in the study. We identified 27 sectors across the four domains. We attempted to quantify the prominence of each sector by counting the number of actors attributed to it in each of the organigraphs. The health sector was the most prominent overall and in all of the domains except road safety, where the most prominent sector was transport. Nine sectors were designated as core sectors (education, health, home affairs, justice, media, recreation, research, social/welfare services and consumers) due to their frequency and coverage across the domains.

The breadth of the 27 sectors identified in the organigraphs, points to the diversity of actors engaged in child injury prevention in general. The differences between the injury domains, both in the broad range of sectors represented and the differing prominence of the sectors as measured by frequency, suggests unique differences between the four domains. For example, in road safety 27% of actors were from the transport sector, however 73% of remaining actors come from 20 other sectors highlighting that road safety, though transport focussed, requires the involvement of many other sectors to ensure effective adoption, implementation and monitoring of evidence based interventions.

Existing literature on sector relevance for child injury prevention is sparse, however general attempts to identify the pertinent sectors have been made, most prominently

in large WHO reports. The European Report on Child Injury Prevention,(3) which focused on unintentional child injury recommends that health ministries should involve ministries concerned with transport, health, planning, leisure, housing, consumer product safety, agriculture, education and law as well as research institutes and the media. The World report on Violence and Health,(30) which focused on violence prevention for all age groups, makes similar recommendations citing the following sectors: criminal justice, education, labour, health and social welfare. The findings from the current study lend support to the recommendations made in these reports. In addition, we identified the following sectors not prominently mentioned in these reports: advocacy, communications, culture, environment, finance, food and drink industry, insurance, maritime affairs, philanthropic organisations, religion and trade.

The diversity of stakeholders identified across the 27 sectors recognized in our study is consistent with the whole-of-society approach to wicked problems, namely the importance of involving the public sector, private sector and civil society to address public health issues.(10) Additionally the whole-of-government approach advocating action at each level of governance, supports our findings regarding the position of actors over four levels of governance.

Limitations

There are a number of limitations to this exploratory study that should be considered. First, this research was part of a public health project and it is possible that a certain bias exists leading to an over-emphasis of the importance of the health sector (based on the number of actors) over the other sectors. However, even if the other sectors were under-represented, the diversity across the 27 sectors identified indicates that the importance of inter-sectoral action for child injury prevention may be even greater than these findings suggest. Second, despite our efforts to ensure wide breadth and coverage of interventions it was not possible to map all child safety interventions and this may have led to the omission of some sectors relevant to child injury prevention. However the breadth of interventions and coverage over the four domains achieved within the study suggests that, at least for the core sectors, the results are likely to be accurate. Third, the proportion of actors a sector represents provides only a rough indicator of its importance. Actors that crossed levels of governance were counted for each level they appeared on. This was only the case in very few instances, (seven actors are counted more than once) so any effect should

be minimal. However the percentage estimates should only be taken as a rough guide of the importance of sectors given the other limitations outlined above.

Conclusion

Child injury has been referred to as a wicked problem requiring inter-sectoral action to address its complexity. However, before the current study we found no attempt to systematically explore and quantify the multi-sectoral involvement in child injury prevention. With the contribution of participants from 24 countries, providing 44 cases, across 4 different child injury domains, we identified 27 sectors. Nine of these sectors (education, health, home affairs, justice, media, recreation, research, social/welfare services, and consumers) were found to be relevant for the adoption, implementation and monitoring of evidence based strategies for each domain of child injury prevention.

We hope that our identification of sectors relevant to child safety provides guidance and practical assistance for stakeholders by highlighting both the fact of inter-sectoral collaboration and the perspective that good health governance requires action across the whole of society and the whole of government.

Further research in this field could be undertaken to look at the way these sectors interact with each other, such as the role of leadership in inter-sectoral collaborations for child injury. It would also be helpful to look at how the position of governance held by the sectors affects collaboration.

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Section Two

Selecting an appropriate intervention

Chapter 4

Child Safety Reference Frameworks – a policy tool for child injury prevention at the sub-national level

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Abstract

Objective

The aim of this paper is to present Child Safety Reference Frameworks (CSRF), a policy advice tool that places evidence-based child safety interventions, applicable at the sub-national level, into a framework resembling the Haddon Matrix.

Methods

The CSRF is based on work done in previous EU funded projects, which we have adapted to the field of child safety. The CSRF were populated following a literature review.

Results

Four CSRF were developed for four domains of child safety: road, water and home safety and intentional injury prevention.

Conclusion

The CSRF can be used as a reference, assessment and comparative tool by child safety practitioners and policy makers working at the sub-national level.

Introduction

Europe has some of the highest and lowest injury rates in the world with large differences in injury mortality between high-income countries and low and middle-income countries.(1) In the European Union in 2010 intentional and unintentional injury deaths for 0-19 year olds ranged from 5/100,000 in the Netherlands to 24/100,000 in Lithuania.(2) Despite large reductions in overall mortality between 2000 and 2010, inequalities between countries are increasing.(3) Additionally there are large inequalities within countries, and the substantial improvements in injury mortality rates in recent years have not been spread equally across society.(4-6)

Child injury, is a complex 'wicked' problem,(7, 8) and its prevention requires the participation of multiple stakeholders. Actors working across the whole of society (public sector, private sector and civil society) and at all levels of government, from the local to international level have a role to play.(9)

In this paper we focus on the sub-national level of governance for child injury prevention for several reasons. First, much attention has been paid to the role of the European and national levels of governance in injury prevention, with encouraging results.(10) However, while policies are often developed at the national level, implementation and enforcement – much of the action – takes place at the sub-national or local level. An area of research somewhat understudied.

Second, the capacity of the sub-national level to focus upon the specific needs of its population is an important characteristic. Diverse risk factors for child injury such as: socio-economic position, employment status,(11) parental education,(12) area deprivation and types of settlement(13, 14) cluster in pockets of society and require tailored action. Thus, effective action at the sub-national level is required to address regional inequalities in child injury rates.

Third, the role of the sub-national level for public health is increasing in many countries, due to decentralization.(15, 16) But, efficient delivery of child injury interventions at the sub-national level may be hindered due to a lack of leadership, infrastructure and capacity.(15, 17)

In this paper we describe the development of a policy advice tool, applicable at the sub-national level, named Child Safety Reference Frameworks (CSRF). The study was part of the European Commission funded project, Tools to Address Childhood Trauma and Children's Safety (TACTICS). CSRF list evidence-based interventions, applicable at the sub-national level, covering four domains of child safety: road, home and water safety and intentional injury prevention. In this paper we describe the development of the tool and its application.

Material and Methods

Haddon categories and design of CSRF

The design and use of the CSRF is built upon the Haddon Matrix(18) and was first used in a regional health management project in Spain(19). It was further refined in the European commission funded project "Benchmarking Regional Health Management II" (BEN II).(20) Using the experiences of Peiro et al and Brand et al we refined the methodology and applied it to child safety at the sub-national level.

We developed a CSRF for each of four domains of child safety: water safety, road safety, home safety and prevention of intentional injury. To identify suitable interventions with which to populate the four CSRF, each domain was clearly defined for scope. The following definitions were used:

- Road safety: prevention of car/bus, pedestrian, bicycle, moped/ motor scooter, all terrain vehicle (ATV) and farm vehicle injuries
- Home safety: prevention of falls (within the home and related to public/school playground equipment), burns/scalds, poisoning, choking/strangulation, drowning in the home (e.g., in a bathtub)
- Water safety: prevention of drowning in pools (public and private) or open water and beach safety
- Intentional injury: prevention of abuse/neglect, violence, suicide and self-harm

We used the definition of good practice as outlined in the European Child Safety Alliance (ECSA) Child Safety Good Practice Guide(21) to guide the selection of appropriate evidence-based interventions.

> "1) An intervention that has been evaluated and found to be effective (either through a systematic review or at least one rigorous evaluation) OR
>
> 2) An intervention where rigorous evaluation is difficult but expert opinion supports the practice and data suggest it is an effective policy / intervention (e.g., use of personal floatation devices to prevent drowning) OR
>
> 3) An intervention where rigorous evaluation is difficult but expert opinion supports the practice and there is a clear link between the policy / intervention and reduced injuries (e.g. secure storage of poisoning) AND
>
> 4) The intervention has been implemented in a real world setting so that the practicality of the intervention has also been examined."

The CSRF is applicable to the sub-national level of governance. Within Europe there are diverse jurisdictional differences regarding the distribution of political power between national, sub-national and local levels. We therefore developed the following inclusion criteria in an attempt to accommodate these differences without being too broad.

We defined a sub-national level intervention for the purposes of the CSRF as:

> "An intervention that is implementable, enforceable or possible to monitor on the sub-national (land, province, department) or local level (city, municipality, commune).
>
> This includes interventions where the decision to implement is made at the national level but responsibility for method of implementation or enforcement lies at the sub-national or local levels."

This definition excludes manufacturing standards such as car safety devices (e.g., airbags) as these are generally developed, implemented and enforced by national or European bodies. Legally banned items such as dangerous toys were excluded for the same reason. Legislative interventions such as laws mandating bicycle helmets were included in the CSRF where either passing laws at a sub-national level was possible or enforcement is carried out at the sub-national level. Clinical recommendations for the treatment of injuries were excluded, except where implementation could lead to prevention (e.g., guidelines regarding diagnosis of physical abuse that can protect the child from further abuse).

To be included in the CSRF interventions needed to conform to both the definition of evidence based good practice and be applicable at the sub-national level.

Literature Review

A literature search for review articles was conducted in February 2012 using PubMed, and The Cochrane Database. Search terms used included 'injury', and 'prevention', as both mesh terms and free text. The search was limited to children (0-18 years) and to review articles published in the last 10 years in English, French and German.

The search yielded 733 results, after excluding irrelevant articles 227 remained, these were reviewed in greater detail for interventions meeting the criteria described above. Reference lists of included articles were also searched for additional publications not picked up in the initial search, but these did not yield any other interventions. Finally, interventions outlined in the following 'core' documents were also included: European Child Safety Alliance (ECSA) Child Safety Good Practice Guide(21) (including the 2010 Addendum)(22), ECSA Child Safety Report Card 2012: Europe Summary,(23) ECSA National Action to Address Child Intentional Injury – 2014,(24) WHO European and World reports on unintentional child injury,(25, 26) and the WHO world report on violence and health(27).

Populating the four CSRF tables

Interventions were assigned to the appropriate row in the CSRF tables using Haddon's definitions of time phase (pre-event, event and-post event):

- Pre-event: interventions designed to prevent the injury event from occurring (e.g., separation of pedestrian walkways from roads).
- Event: interventions designed to protect host (minimise energy exchange) in the event of an injury (e.g., bicycle helmets, surfacing materials under public playground equipment).
- Post-event: interventions designed to reduce the impact and maximise salvage (e.g., poison control centres, child helplines)(18).

When assigning the interventions to the appropriate column we modified the definitions of host, agent and environment slightly by assigning them based on *who or what the intervention targeted or whose behaviour it attempted to change.* The headings of the columns were defined as follows:

- Host: interventions targeting the person at risk of injury. In the case of home injury, parents/caregivers were included in this column to account for the importance of high quality care and supervision to prevent injuries.
- Agent: interventions targeting the agent/means of/vehicle transferring the energy (e.g., car, gun, assailant, water)
- Physical environment: interventions targeting the physical characteristics surrounding the event (e.g., road, building, playground).
- Social environment: interventions targeting the social environment surrounding the event including all laws/legislation (e.g., laws regarding vehicle speed) as well as the existence of committees, practice guidelines, surveillance, etc.

The CSRF were reviewed and validated by the Scientific Committee of TACTICS and selected experts. The four finalised CSRF addressing evidenced-based interventions at the subnational level are presented in Table 4.1, Table 4.2, Table 4.3 and Table 4.4.

Table 4.1. CSRF, Road Safety

	Strategies targeting the child or caregiver	Strategies targeting the agent	Policies targeting the physical environment	Policies targeting the social environment
Pre-Event	– Pedestrian skills training to improve child pedestrian road crossing skills[1] – Cycling skills training for children[1] – Media campaign at least once in past five years targeting child and adolescent pedestrian, passenger and cycling safety[2]	– Regular alcohol sobriety checkpoints[3, 4] – School-based programs for reduced drinking and driving[4, 5] – Education regarding risks of driver fatigue[6] – Limit on engine size (125cc) for learner moped riders[7]	– Existence of traffic calming measures (e.g. speed bumps)[1, 8] – Separation of pedestrian walkways from roads[8] – Presence of cycling lanes or pathways [1, 7]	– Enforcement of drink driving law[8] – Enforcement of curfew laws to restrict teenage driving at night[3] – Enforcement of legislation reducing vehicle speeds in residential areas and school zones[1, 2] – Enforcement of law preventing children younger than 16 from riding on all terrain vehicles (ATV)[9] – Regional ministry/government department with mandated responsibility for child and adolescent pedestrian, passenger/driver, motorcycle and cycling safety[2] – Government approved regional injury prevention strategy with specific targets and timelines related to child and adolescent pedestrian, passenger/driver, motorcycle and cycling safety[2] – Policy that increases access to child passenger restraint systems (CPRS) for disadvantaged families CPRS included as essential child-care articles or taxed at lower rate or subsidies offered through programmes targeting disadvantaged families[2]
Event	– Interventions combining information dissemination on child passenger restraint safety with enhanced enforcement campaigns[1, 4] – Interventions combining child passenger restraint distribution, loaner programmes or incentives with education programmes[1, 4] – Regional/community or school based education approaches including free provision of bicycle helmets[4, 10]			– Enforcement of seat-belt laws – Enforcement of law mandating child passenger restraints[1] – Enforcement of law requiring children to remain seated in rear facing car seats until age 4 years[2] – Enforcement of law requiring children and adolescents to remain seated in the back seat of a motor vehicle until age 13 years[2, 11] – Enforcement of law requiring children up to age 18 to wear bicycle helmets[1, 4] – Enforcement of legislation mandating helmets for mopeds, motor scooters and ATVs[4, 7]
Post-Event				– Surveillance systems including child road injuries (based on emergency or police data) that can direct prevention efforts to injury types resulting in the greatest local burden[4]

Table 4.2. CSRF, Home Safety

	Strategies targeting the child or caregiver	Strategies targeting the agent	Policies targeting the physical environment	Policies targeting the social environment
Pre-Event	– Educational programmes encouraging use of fall prevention safety devices (e. g. window safety mechanisms, stair gates)[1, 12] – Fire safety skills training to increase knowledge and behaviour of both children and parents[1] – Home safety educational interventions promoting the installation of smoke alarms and supplying alarm[13, 14] – Education / advocacy campaigns around the safe use of fireworks[1] – Home safety education for parents on the safe storage of harmful chemicals including provision of safety materials[4] – Individual-level education/counselling for parents on unintentional childhood injury prevention in the clinical setting[1] – Home safety counselling programmes for parents (on prevention of falls, poisoning, burn etc.)[1, 12] – Home based social support, such as home visiting programmes for new parents[1, 4, 15] – Media campaign at least once in past five years targeting child and adolescent fall, poisoning, scald/burn and choking prevention[2]	– Home safety interventions for parents promoting a safe hot water exit temperature[13]	– Building codes requiring working smoke detectors in all public buildings (e.g., hospitals, schools and kindergartens)[2] – Smoke detector give away programmes targeting high-risk neighbourhoods and multi-faceted community campaigns with specific objective of installation of smoke detectors[1] – Non-voluntary building codes for *new* dwellings (legal standards to address hazards related to falls, fire injuries, other thermal injuries, collisions, entrapment, cutting and piercing, drowning, electrocution and poisoning)[16, 17] – Non-voluntary building codes for existing dwellings (legal standards to address hazards related to falls, fire injuries, other thermal injuries, collisions, entrapment, cutting and piercing, drowning, electrocution and poisoning)[16, 17] – Policy that increases access to childcare safety equipment, such as stair gates, for disadvantaged families (e.g., regional equipment give-away / loaner programmes)[2, 12]	– Enforcement of law requiring environmental changes to windows in all buildings with more than one storey (e.g. window guards or locks)[2, 4] – Enforcement of law requiring safe design of guardrails for all private and public buildings to prevent falls from balconies and stairs[2, 4] – Enforcement of legislation requiring safe tap water temperature[1, 4, 18] – Enforcement of law controlling the sale of fireworks[2, 4] – Enforcement of legislation requiring installation of smoke detectors in new and existing houses[4] – Government approved regional injury prevention strategy with specific targets and timelines related to child and adolescent fall, poisoning, burn/scald and choking prevention[2] – Incorporation of injury prevention and control into the comprehensive nursing care[a] of children, families, and communities[19-21] – Regional ministry/government department with mandated responsibility for child and adolescent fall / scald / burn / choking prevention[2]
Event				– Enforcement of standards[b] requiring safe depth of specified types of surfacing materials under public playground equipment and regular maintenance of those material[1, 2, 22]
Post-Event				– Poison control centres[c] with education of public regarding the use of centre[1, 4] – Surveillance systems including child home injuries (based on emergency data) that can direct prevention efforts those injuries resulting in the greatest local burden[4]

Table 4.3. CSRF, Water Safety

	Strategies targeting the child or caregiver	Strategies targeting the agent	Policies targeting the physical environment	Policies targeting the social environment
Pre-Event	– Water safety skills training for children (including swimming lessons after the age of 5 years) to improve swimming performance[1, 24] – Community-based education / advocacy to increase personal floating devices use[1, 25] – Parental education on importance of supervision[24, 26] – Programme of child home visits that includes education for parents on child water safety[2, 27] – Media campaign at least once in past five years targeting child and adolescent water safety[2]	– Enforcement of safety standards[d] for public swimming pools e.g. water depth markings, step edges marked with contrasting colours, onsite safety equipment, suction outlet covers and chemical standards[1, 2, 4]	– Existence of safe crossings over open bodies of water such as canals and irrigation ditches[4] – Well-marked swimming areas free of hazards[4] – Existence of water collection container covers (e.g. wells) with heavy grills[4] – Policy requiring qualified risk assessment of all designated public water recreational areas (e.g., assessment conducted by qualified inspector)[2] – Investment programme to renew infrastructure to provide equitable access to public swimming pools for swimming lessons for school age children[2] – Signage around water displayed using clear and simple pictogram warning signs[1,17]	– Enforcement of law requiring mandatory use of personal floatation device/lifejacket by children while on the water (e.g. while boating, sailing, etc.)[2] – Enforcement of legislation requiring isolation fencing with secure, self-latching gates for all pools, public, semi public and private including both newly constructed and existing pools[1, 2, 4, 24] – Policy governing water safety for leisure/recreational programming at the community level (e.g., minimum levels of supervision, training or safety equipment, etc.)[2] – Policy making water safety education, including swimming lessons, a compulsory part of the school curriculum[2] – Ministry/government department with mandated responsibility for child and adolescent water safety[2] – Government approved regional injury prevention strategy with specific targets and timelines related to child and adolescent water safety[2]
Event	– Training for parents and caregivers in infant and child CPR[4, 24]		– Existence of adequately qualified, trained and equipped Lifeguards[1, 4, 24]	– Enforcement of law stating minimum number of lifeguards required on beaches or other areas designated for water leisure activities[2] – Enforcement of law stating minimum number of lifeguards required at public pools[2]
Post-Event				– Surveillance systems (based on emergency data/ lifeguard incidence reporting) that can direct prevention efforts to those injuries resulting in the greatest local burden[4]

Table 4.4. CSRF, Intentional Injury Prevention

	Strategies targeting the child or caregiver	Strategies targeting the agent	Policies targeting the physical environment	Policies targeting the social environment
Pre-Event	– Child sexual abuse prevention programmes – teaching children about body ownership, abusive situations[28, 29] – School based programmes to prevent violence (building upon youth's social competencies and skills)[30, 29] – School based suicide prevention programmes (to improve knowledge, attitudes and in some cases help-seeking behaviour)[31] – Media campaign increasing awareness regarding maltreatment and its prevention in last 5 years[32] – Media campaign increasing awareness regarding bullying and its prevention in last 5 years[32] – Media campaign increasing awareness regarding suicide / self-harm and prevention[32] – Existence of programmes providing information about drug abuse[29, 3] – Existence of adult-supervised after-school programmes for school-age children[29] – Extra-curricular activities such as sports and recreation, art, music and drama for school age children[29] – Policy stating that life skills education (including coping skills, interpersonal communication, goal setting, anger management, and advocacy skills) a mandatory part of school curriculum[32, 33]	– Early childhood development programme[e 32, 34] – Parental education about abusive head trauma (shaken baby syndrome)[28] – Existence of programmes to improve parents' child rearing skills, knowledge of child development and encourage positive child management strategies[28, 29] – Existence of support groups to strengthen parents' social network.[28] – Existence of services for adults abused as children (mental health referral)[29] – Gang prevention programmes[29] – Existence of home visitation programme that focuses on families at-risk of violence against children[32] – Existence of gun control policies such as "gun buyback" and weapon amnesties[3, 29]	– Incorporation of principles of "crime Prevention through Environmental Design" (CPTED)[f] in town planning[29, 35] – Existence of policies regarding safe routes to schools[29] – Availability of affordable childcare facilties[29]	– Enforcement of law prohibiting corporal punishment in the home and at school[32] – Violence prevention policy that specifically addresses child maltreatment / neglect[32] – Regional government contact or focal point has been identified for intentional child injury[32] – Regional ministry/government department responsible for coordination of violence prevention[32] – Violence prevention strategy that specifically addresses interpersonal violence between children and youths (e.g. bullying)[32] – Policy requiring schools to have committees to address violence in the family and school environment, including bullying[29, 32] – Community policing[g 29] – Regional government led national injury prevention strategy with specific targets for the prevention of intentional injury/violence against children[32] – Self-directed violence prevention policy[32] – Ombudsman office(s) with special mandate to protect children's rights[32] – Regional child protection system that assures inter-agency and inter-departmental coordination and cooperation with processes, procedures and protocols and data-collection[32]
Event				
Post-Event	– Existence of services for victims of physical abuse (therapeutic day care, emphasis on improving cognitive and developmental skills)[29] – Policy that prescribes that all victims of child maltreatment receive intervention / treatment[32] – Existence of publically funded child helpline[32] – Existence of services for children who witness violence[29] – Regional policy on support and assistance for children who are victims of violence/maltreatment to ensure their access to justice (e.g., child-friendly investigation, interview and court proceedings to avoid secondary or repeat victimisation, child-sensitive procedures)[32]	– Existence of intensive family preservation services[h 29]		– Enforcement of law mandating reporting by professionals of suspected child maltreatment/neglect case[29, 32] – Medical guidelines for radiologists to diagnose child abuse[36] – Multi-disciplinary teams (child protective services, police, medical examiners, forensic paediatricians) to evaluate cases of death or near death in children[37] – Child protection services[i 29] – Child protection committee in hospitals[38] – Checklist to help ED nurses diagnose suspected cases of abuse[39] – CME for doctors and nurses to identify signs of maltreatment, neglect and abuse[29, 40] – Regional policy requiring specific police units and/or specified mandatory training for police officers who interact with children or deal with children who are victims of violence[32] – Guidelines regarding the reporting of suicide in the news[41] – Media campaign to increase disclosure of child abuse and neglect[29] – Regional legislation or policy to protect the identity of child victims[32] – Data that would allow national estimate of prevalence of suicide/self-directed violence in children and youths[32] – Data that would allow regional estimate of prevalence of child maltreatment[32]

[a.] Nursing care: child injury prevention information provided by nurses in the context of the emergency department, general practice departments or community nursing

[b.] Surfacing materials such as sand or wood chips to a depth of 23-31 cm (9-12 inches) under playground equipment. Optimal equipment height to reduce risk of head injury is 1.5 m (5 feet)[1]

[c.] Poison Control/Information Centres: The main function of a poison information centre is to provide information and advice concerning the diagnosis, prognosis, treatment, and prevention of poisoning, as well as about the toxicity of chemicals and the risks they pose

[d.] Safety standards for swimming pools such as UK Health and Safety Executive guidance on Managing Health and Safety in Swimming Pools: http://www.hse.gov.uk/pubns/priced/hsg179.pdf

[e.] Early Childhood Development Programme: a programme with national coverage whose purpose is to facilitate achievement of the many skills and milestones that children are expected to reach by the time they reach the age of five[32]

[f.] CPTED asserts that "the proper design and effective use of the built environment can lead to a reduction in the fear and incidence of crime, and an improvement in the quality of life"[35]

[g.] Community Policing: also known as problem-oriented policing involves building community partnerships and solving community problems relevant to that area, it can involve multi-disciplinary collaboration e.g., with mental health services[29]

[h.] Intensive Family Preservation Services: This type of service is designed to keep the family together and to prevent children from being placed in substitute care[29]

[i.] Child Protection Services: agencies that investigate and try to substantiate reports of suspected child abuse[29]

Results

Overall, 127 interventions were identified: 27 in road safety, 26 in home safety, 23 in water safety and 51 in intentional injury prevention. 71% of interventions fell into the pre-event phase, 11% into the event phase and 18% into the post-event phase. There were no interventions identified in any domain for two cells: 'event/policies targeting the agent' and 'post-event/policies targeting the physical environment'. The distribution of interventions over the time-phases varies by injury domain. In road and water safety most of the interventions fell into the pre-event phase (17 and 18 respectively) followed by the event phase (9 and 1) and finally the post-event phase (1 each). In home safety and intentional injury prevention most of the interventions were also in the pre-event phase (23 and 32 respectively). In the event phase there was one intervention in home safety and none in intentional injury prevention. In the post-event phase there were 2 in home injury and 19 in intentional injury prevention.

Application of the Frameworks

In order to apply the CSRF to a sub-national region a questionnaire was developed and validated in collaboration with partners of the TACTICS project from 6 countries. To get a more nuanced overview of activity in the area of child injury prevention at the sub-national level the questionnaire asks two things; one, whether the intervention is in place in the territory in question and; two, the estimated percentage of the target population covered by the intervention. For assessment purposes the intervention had to be implemented in the territory in question and covering at least 75% of the target population in order to be considered 'implemented'.

Rapid Appraisal

After inputting the quantitative data from the questionnaire the user can conduct a rapid appraisal of child injury prevention activities in the territory in question. For each cell of the CSRF the number of interventions implemented (and reaching more than 75% of the target population) is counted and then calculated as a percentage of the total number of interventions for that cell. Using the software Microsoft Excel, conditional formatting is applied to the percentages assigning a shade of grey, with white (no colour) representing 0% of interventions implemented and dark grey representing 100% of interventions implemented (see Table 4.5).

Table 4.5. Fictitious example of a rapid appraisal for road safety

Road	Interventions targeting the host (child)	Interventions targeting the "agent" (vehicle/driver)	Interventions targeting the physical environment	Interventions targeting the social environment
Pre-event	67% 2/3	75% 3/4	100% 3/3	43% 3/7
Event	33% 1/3			50% 3/6
Post-event				100% 1/1

zero interventions identified	0%	20%	40%	60%	80%	100%

Discussion

The CSRF were developed for practitioners and policy makers working in child injury prevention at the sub-national level as a reference, assessment and comparative tool. As a reference tool the CSRF can help bridge the gap between research and practice by providing accessible information on sub-national level evidence-based interventions. In a second step the CSRF and questionnaire can be used to assess which interventions are already in place in the territory and to what extent they cover the target population. The results can then be used to perform a rapid appraisal,(Table 4.5) providing a visual representation of the state of affairs – showing where interventions are in place and where there are gaps. Finally the CSRF can be used to compare the situation within a territory in terms of: intervention coverage, over time and from territory to territory (nationally and internationally).

The applicability of the CSRF to the sub-national level is important due to the influence of this level of governance on injury prevention, such as in environment modification.(25, 26) In a situation where political power may not be matched by a

deep understanding of child safety issues the CSRF, as a reference tool, could complement the policy maker or practitioner's knowledge of local geography and populations with information on evidence based solutions. However, the interventions included in the CSRF are not weighted by effectiveness, making it difficult, based on the CSRF alone, to choose among them. Similarly some interventions were only found to be effective when implemented in parallel with others - e.g., a multi-faceted approach such as media campaign and speed limit enforcement. Though, as a rule, a combination of approaches is usually found to be most effective and is therefore recommended(21).

The component of the questionnaire regarding the level of implementation (percentage of target population coverage) of the intervention is an improvement on the previous Reference Framework methodology.(28) It draws attention to the importance of equitable intervention coverage (proportionate universalism)(29) to address health inequalities and highlights interventions with low population coverage. The time required to complete the questionnaire, especially finding population coverage data, is a challenging aspect of the application of the CSRF. Though one could argue that if it is difficult or impossible to verify an intervention's existence and the extent to which it is implemented there is a clear gap in monitoring and evaluation – a valuable finding in itself.

The questionnaire requires input from stakeholders in diverse sectors, which could also slow down the data collection process. Nevertheless, inter-sectoral action is a vital component of child injury prevention, thus, completing the questionnaire could be a good opportunity for practitioners and policy makers to build or improve their professional network. Equally, notwithstanding the length of time required to complete the questionnaire, once the data are placed into the CSRF the visual accessibility of the rapid appraisal reduces the time required to transmit the results to other stakeholders, leaving more time to discuss how to move forward. Additionally, users are not required to complete CSRF for all four domains of child safety at one time, they can be done as separate assessments.

Inequalities in child injury rates, within and between countries, demonstrate the opportunity and necessity for good practice to cross borders to successfully reduce child injury rates. The CSRF provides a platform and context to compare and learn from other regions.

Conclusion

This policy tool, designed for child injury prevention practitioners and policy makers at the sub-national level, can be used as a reference, measurement and comparative tool. Additionally the CSRF may provide opportunities for inter-sectoral networking, knowledge exchange and capacity building. We hope that this will encourage greater uptake of evidence based child safety interventions at the sub-national level, thereby improving child safety and reducing inequalities both within and between countries.

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Chapter 5

Ethical considerations for the design and implementation of child injury prevention interventions – an example of delivering and installing safety equipment into the home

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Abstract

Introduction

Public health ethics is a growing field of academic interest but ethical discussion of injury prevention seems to have received limited attention. Interventions that promise to be effective are not necessarily – without explicit justification – 'good' and 'right' interventions in every sense. This paper explores public health ethics in the context of child injury prevention with the objective to initiate interdisciplinary dialogue on the ethics of child safety interventions.

Method

A framework of seven public health ethics principles (non-maleficence, health maximisation, beneficence, respect for autonomy, justice, efficiency and proportionality) were applied to an intervention to promote child safety in the home.

Results

Preventing child injury in the home is ethically challenging due to the requirement for the state to intervene in the private sphere. Non-maleficence and beneficence are difficult to judge within this intervention as these are likely to be highly dependent upon the nature of intervention delivery, in particular, the quality of communication. Respect for autonomy is challenged by an intervention occurring in the home. The socio-economic gradient in child injury risk is an important factor but a nuanced approach could help to avoid exacerbating inequalities or stigmatisation. Equally, a nuanced approach may be necessary to accommodate the principles of proportionality and efficiency within the local context.

Conclusion

We conclude that this intervention is justifiable from an ethical perspective but that this type of reflection loop is helpful to identify the impact of interventions beyond effectiveness.

Introduction

Injury prevention is a central element of public health and, as with other branches of public health, it can conflict with moral norms and values. When deciding which intervention to implement, evidence of effectiveness is vital. However, interventions that promise to be effective are not necessarily – without explicit justification – 'good' and 'right' interventions. 'Good', in ethical terms, relates to benefits – an intervention that benefits someone is a 'good' intervention. 'Right' refers to whether the intervention conforms to rules and regulations, embedded in moral values and norms.

While public health ethics is a growing field of academic interest, ethical discussion surrounding injury prevention seems to have received limited attention. Runyan explored the role of ethical principles with her presentation of a third dimension to the Haddon matrix.(1) Since then paternalistic issues(2) such as mandated helmet use,(3) seat belt use and safety equipment in sports (4,5) have been looked at from an ethical perspective. However, discussion of safety interventions from a broader public health ethical viewpoint is rare.

Establishing clarity on the ethical implications of injury prevention activities is particularly important given the multiple sectors involved in its prevention.(6) Child injury has been described as a wicked problem.(7,8) This type of problem is characterised by a lack of consensus among the different stakeholders, on a clear cause and a clear solution.(9) This lack of consensus is challenging, especially within a multi-sectoral context, and could result in orientation towards different norms and values, or, further confusion. By exploring and revealing the perspectives and positions of the different stakeholders building consensus could be more transparent.

In this paper we apply key norms of public health ethics to an example intervention from child home safety. By applying ethical principles to a well-known and widely implemented intervention we hope to illustrate the value of ethical deliberation in the context of injury prevention and draw the reader's attention to the public health ethics inherent in routine child safety interventions. The objective is to initiate and facilitate interdisciplinary dialogue on the ethics of child safety interventions to encourage further work in this apparently understudied area.

Method

We applied a public health ethical framework(10) to an intervention to promote child safety in the home. In this section we describe the example intervention followed by a presentation of the public health ethical framework.

The majority of injuries among the age group 0-5 years occur in the home environment, the principle mechanisms are falls, burns, poisonings, drownings and suffocation.(11) In response, interventions have been developed combining delivery of home safety education with provision and installation of safety equipment. In many cases the intervention is directed at low-income families and the child safety equipment (such as stair gates, fire guards, smoke alarms) is provided and installed free of charge. Healthcare professionals (HCP), often health visitors, provide home safety education in the form of a consultation with the family in their home or in a clinical setting.

This type of intervention has been the subject of a randomised controlled trial(12) and a Cochrane systematic review,(13) it is recommended by national and supra-national organisations such as Public Health England(11) and WHO European region.(14) It is considered to be good practice and seems to have become a routine activity.(15) However, despite wide implementation it appears that an ethical assessment of home visits for child safety has not been undertaken.

We assessed the multi-faceted version of this home safety intervention, assuming, according to common practice, that a consultation takes place in the family home with representatives (parents or guardians) of a low income family with a child/children aged 0-5 years. The consultation is conducted by an HCP and a safety evaluation of the home is undertaken either by the HCP or an outside organisation. The consultation is followed by the provision and installation of safety equipment, such as, stair gates, fire guards, smoke alarms, socket protectors and window locks.

The Public Health Ethical framework

Several frameworks for public health ethics exist,(16) we chose to apply the seven ethical principles that are proposed for the field of public health ethics by Schröder-Bäck et al.(10) The seven ethical principles highlight core values of public health that could be at stake when selecting an intervention for implementation. We consider

that the broad presentation of key public health ethical values and norms makes it an appropriate framework for a multi-sectoral issue such as child safety.(6)

The framework (Figure 5.1) presents ‘principles’ (different moral norms), and highlights possible tensions between them. When conducting an ethical assessment of a particular intervention, the frequently tense relationship between several norms has to be considered. This is in order to identify moral conflicts and to work towards a justifiable conclusion: to go forward and implement an intervention; to adapt certain elements; or, to reject unjustifiable interventions.

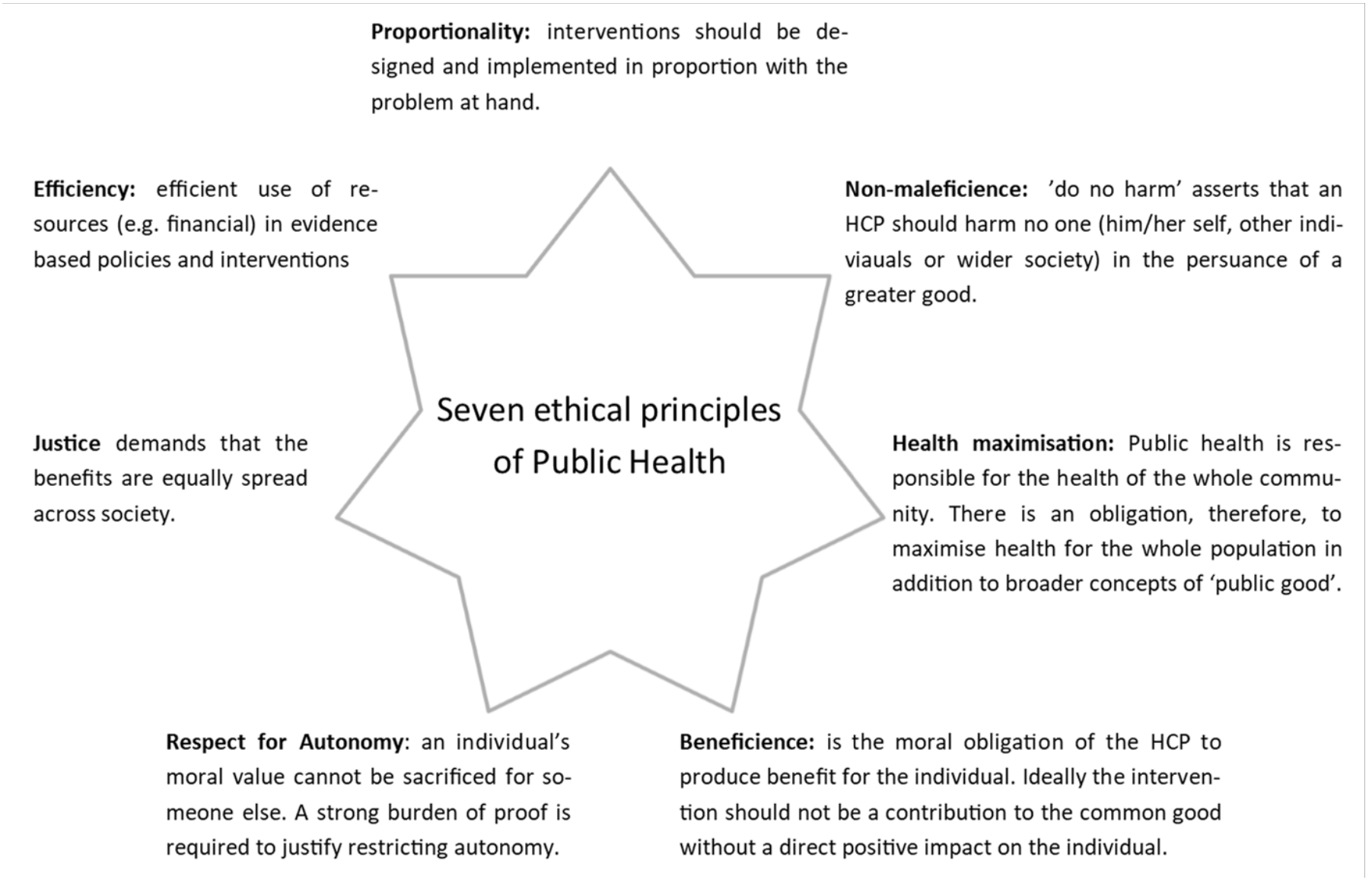

Figure 5.1. Seven ethical principles for public health

Public health ethics emerged from bioethics, which has its roots in medical ethics. Non-maleficence and beneficence are the core ethical principles of the Hippocratic Ethos, the classic normative guidance for clinical medicine. The normative scope of these ethical concepts is relevant to public health, however, the concepts are not always appropriately adapted to the domain. There is an obligation in public health, to move beyond individual beneficence to maximise the health of the whole population. The moral obligation of interventions to benefit each and every individual is seen here as an ideal, thus weaker than a norm since benefitting every single individual cannot always be achieved by population based interventions.

A tension arises because interventions that maximise population health could, in order to achieve a greater good, challenge the will and interests of individuals. Respect for autonomy protects the individual and his or her capacity to make choices and pursue their own conception of the good. Paternalistic benevolence contained in the principles of non-maleficence and beneficence could lead to an imposition of a conception of the good that is defined by public authorities, and not necessarily shared by every individual. Accordingly, such benevolence is strongly tempered by the emphasis on respect for individual autonomy. Justice is another corrective to the aggregate aims of 'health maximisation' by demanding a fair distribution of benefits and burdens.

Efficiency asserts that interventions should be effective and cost-effective, there is a moral obligation not to waste public funds. Likewise, interventions should be proportionate to the problem, if more than one intervention exists, all things being equal, the least intrusive one - the least restrictive of autonomy - should be selected.

The type of home safety intervention described above may reduce injuries. However, if it conflicts with accepted norms and values, such as autonomy and self-determination, it cannot be called 'good', *and* 'right' without further qualification or justification.

Results

Child injury prevention interventions in the home pose a particular ethical challenge, amongst other reasons, because the state is intervening in both the private space and the parent-child relationship. The home provides more than simply shelter, it provides an environment away from the rules, expectations and restrictions of the

outside world.(17) It is a place where one sets, as the term ‘autonomy’ implies, the rules one follows.

In terms of injury prevention, the home environment is less supportive of passive methods of injury prevention thus active methods have to be used: stair gates have to be closed; children in the bath require constant supervision; even smoke alarms, a passive intervention, need new batteries occasionally.(18) While the levels of activity required vary, it is incumbent upon parents to take action for safety equipment to be effective. Furthermore, a major determinant of home injuries is supervision, itself determined by myriad other influences.(19)

In essence, to prevent home injury it is necessary to modify parent’s behaviour, thus interfering in an intensely private parent-child relationship. It is presumed, in general, that parents act in the best interests of their children. Parents provide for the basic needs of their children and have the right to educate and discipline them in a way that reflects the values of the family. Therefore, interference, from others or the government is only tolerated if parental behaviour falls outside a broad range of socially accepted norms and values.(17)

In the following section we discuss the relevance of each ethical principle in relation to the home safety intervention described above.

Non-Maleficence and beneficence

Information and safety equipment provided to all households taking part can be considered beneficial to recipients. Additionally, the way the advice or information is transmitted could have a positive psychological impact, e.g., helping the recipient feel supported.

Physical harm due to an intervention such as this one is unlikely, presuming that the equipment provided adheres to safety standards and that installation is of high quality. However, there could be harmful psychological or sociological impacts.

A safety inspection of the home by someone unknown to the recipient could induce feelings of intrusion into the personal space, judgment on personal choices, stigmatisation and furthermore, judgement on parenting choices or styles. Negative psychological effects could have a higher impact on vulnerable people such as those with mental health issues, learning or linguistic difficulties or immigrant or refugee status. In addition, low-income families, likely to be reliant on state welfare payments

could be fearful that non-compliance with the intervention or 'failing' a safety assessment may lead to greater involvement of other state actors such as social services.(20)

It is difficult to judge whether more benefit than harm is produced by this intervention, as it is highly dependent upon the nature of intervention delivery, namely the quality of communication.(21) If the HCP is well-trained in communication with vulnerable people, and the interaction is productive, the recipient may feel empowered and informed about protecting the child in their care. One could conclude, therefore, that the intervention had an overall positive effect. However, if communication between HCP and recipient was suboptimal and the recipient already vulnerable, the intervention could have a negative impact. This could mean that the intervention had produced more harm than benefit for that particular household. While this alone may not lead to a greater risk of injury, the risk of jeopardising such a relationship should be taken into account and balanced with the potential benefit of the intervention.(22)

Day to day delivery of this type of intervention, especially communication quality, is likely to affect the impact. If compared to an intervention such as mandated seatbelt wearing, this multi-faceted intervention, taking place in the home, is more complicated and weighing up the harm and benefit much less clear cut.

The importance of children's injury risk in the context of other aspects of their health and development is also relevant. Children are at risk of injury in their early lives but it is also argued that encountering different risks is essential for their health, health behaviour and taking an active role in society.(23,24) Striking a balance between protecting and promoting all aspects of children's health and development is vital.

Health Maximisation

Public Health interventions aim to have a positive *health* effect on the whole population. The first question should be is the intervention effective at reducing injuries in a real world setting? Second, can a significant health gain on population level be obtained with such an intervention?

One could argue that preventing a single child death would avert the enormous negative consequences; physical, social, psychological and economic that are associated with injury for the individual, family and society.(25) Consequently, the benefits of the intervention could extend beyond the number of fatalities prevented

to wider societal benefits. However, there are few co-benefits associated with this type of intervention.(26) The intervention would not protect other age groups from injury, it will not have any impact on other child health issues such as obesity, and it will not have any impacts outside public health. One could argue, therefore, that health maximisation of this intervention is implied, yet limited to benefits associated with a reduction in injury incidence.

Efficiency

Public money is limited – in practice, decision makers have to prioritise their actions based on local need and resource availability. Therefore, financial efficiency has to be considered, not in isolation, but in parallel to the positive effects programmes have on individuals and populations.

Respect for Autonomy

An intervention including a home visit crosses the line from the public to the private sphere. This could be considered an intrusion of personal or familial privacy, conflicting with the feelings and options of autonomous behaviour. On the other hand an intervention in the home might provide an occasion where parents feel more comfortable disclosing personal information, such as histories of child abuse or domestic violence.(27)

It is no doubt possible for the recipient to refuse such an intervention, but they may feel obliged, it may be more difficult to tell someone to leave your home than to leave the clinic yourself. Parents may feel unable to refuse such an intervention for diverse reasons: fear that they may be labelled 'irresponsible' by the HCP; fear that they could lose welfare payments if they refuse; or, simply not daring to say 'no' to an HCP.(20)

Moreover, installing safety equipment could be contrary to parents' preferences. Even if stair gates are proven to be efficient in injury prevention, they can be disagreeable. Accordingly, a family may want to make the trade-off themselves. In their deliberation, very personal and particular factors may play a role.

When respecting autonomy, this type of intervention presents a challenging situation given a parent's right to bring up their children in alignment with their family's values. Parents may disagree with HCPs for a variety of valid reasons based on personal choice and preference. It is imperative to respect parent's wishes, yet balance this deference against the risk posed to the children in question. Emphasising and

reiterating that parents have a right to refuse the intervention, as practiced in the clinical setting, is thus vital. Personal privacy is a high good in our liberal societies and respect for autonomy grants privacy an important role, any infringement of privacy requires a high burden of proof to be accepted.

Justice

Distributive justice, that benefits and burdens are distributed fairly, should also influence intervention choice and delivery.(22) In some cases free provision and installation of safety equipment for poorer families is included in the intervention to address affordability of safety devices. However, structural causes of home injury such as overcrowding, poor quality housing and homelessness are unlikely to be significantly addressed by this type of intervention. There is a risk, therefore, that even a targeted intervention would not effectively address socio-economic inequalities and may even exacerbate them.(28) Moreover, targeting may give the impression that only certain groups are at risk of home injury. Furthermore, harm could be caused in the form of stigmatisation. A population approach, addressing the prevention paradox,(29) as opposed to a targeted approach could have a similar impact without risking stigmatisation, as was found in a bicycle helmet programme in Canada.(30)

Within the context of justice and fairness, the importance of maintaining social cohesion should not be overlooked. Cultural barriers such as mistrust of health care professionals and fears over issues such as immigration or child protection are important.(31) One could argue that the expected effectiveness of such an intervention for home safety is not worth risking trust in HCPs, given the importance of other child health issues, such as vaccination.

Proportionality

Children are at risk of injury in the home, however, whether this risk warrants the state to cross the line from public to private is an important consideration. Does the risk justify an intervention *including* a home assessment? Or, would providing injury prevention information in a public place be sufficient? Would it be possible to design an intervention using a stepped intervention approach?(32) By including concepts of proportional universalism, fairness and justice could also be respected.(33)

Discussion

This assessment highlights the breadth of ethical concerns relevant to intervention implementation - in addition to effectiveness. These concerns could prove to be important enough to prevent an intervention from being implemented or, could result in intervention adaption(34) to improve its 'fit' to the local culture and context.

Studies describe parental anxiety, on a daily basis, based on fears of injury such as traffic and abduction. In some cases these were not based on local or recent instances but informed by national and even international events.(35,36) Engaging actively with local families regarding the risks (perceived and actual) affecting them may be a constructive way of positioning an intervention within local needs, norms and values.(37,38) Consultation must also work in the sense that, citizens approaching the authorities to raise concerns about the safety of their housing or community are taken seriously, and, their concerns addressed.(39)

Conclusion

As stated by Duncan (2009):

"Balancing and coming to conclusions about the rights and duties of individuals, communities, populations and governments with regard to protecting and maintaining health is in many ways the central, deeply complex task of public health work."(40)

We would argue that injury prevention is undoubtedly 'a deeply complex task' with many diverse actors. Activities need to be positioned in the broad scope of public health aims and responsibilities, public health ethics and actual risk.

The intervention discussed here is, following our assessment, acceptable from an ethical point of view. The intrusion upon autonomy is challenging but manageable; the risk of harm is low and controllable; and beneficence and health maximisation are implied. Nevertheless, this type of reflection loop is helpful to remind us of the impact of interventions beyond effectiveness. Indeed, policymaking for injury prevention needs to be robust and convincing to stand up to public justification given the fine line it treads between promoting safety and limiting autonomy. Following this analysis we suggest to include ethical dimensions in routine intervention evaluation prior to their wide implementation. It could be helpful to conduct such an analysis in a multi-sectoral context with the participation of the target population.

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SECTION THREE

PUTTING INTERVENTIONS INTO ACTION

Chapter 6

Facilitators and barriers for the adoption, implementation and monitoring of child safety interventions: a multinational qualitative analysis

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Abstract

Introduction

The efficiency and effectiveness of child safety interventions are determined by the quality of the implementation process. This multi-national European study aimed to identify facilitators and barriers for the three phases of implementation: adoption, implementation and monitoring (AIM process).

Methods

Twenty-seven participants from across the WHO European Region were invited to provide case studies of child safety interventions from their country. Cases were selected by the authors to ensure broad coverage of injury issues, age groups and governance level of implementation (e.g., national, regional or local). Each participant presented their case and provided a written account according to a standardised template. Presentations and question and answer sessions were recorded. The presentation slides, written accounts and the notes taken during the workshops were analysed using thematic content analysis to elicit facilitators and barriers.

Results

Twenty-six cases (from 26 different countries) were presented and analysed. Facilitators and barriers were identified within eight general themes, applicable across the AIM process: management and collaboration; resources; leadership; nature of the intervention; political, social and cultural environment; visibility; nature of the injury problem and analysis and interpretation.

Conclusion

The importance of the quality of the implementation process for intervention effectiveness, coupled with limited resources for child safety makes it more difficult to achieve successful actions. The findings of this study, divided by phase of the AIM process, provide practitioners with practical suggestions where proactive planning might help increase the likelihood of effective implementation.

Introduction

There is a strong evidence-base of effective child safety interventions that has been established over the last few decades.(1-4) Many of these interventions have been implemented and, in the WHO European Region between 2000 and 2011, the number of deaths among children (0-14) due to injury has decreased by 44%.(5) However, not all children in Europe enjoy the same level of protection. Child injury rates vary between and within countries and the gap in Europe, between high income countries and low and medium income countries, has widened.(5)

Widespread implementation of evidence-based child safety interventions, at all levels of governance, is one way to approach the problem.(6) However, there are some important considerations during implementation. The implementation process itself is a determinant of intervention effectiveness: programmes that have been carefully implemented and are unimpeded by serious implementation problems are associated with better outcomes.(7) Additionally, the sustainability of interventions plays a role. Insufficient intervention duration can affect whether an intervention is effective.(8)

Despite the importance of implementation, scientific research in injury prevention is largely focused upon outcome as opposed to process providing practitioners with little guidance as to *how* to make an intervention work.(9-13)

Several reviews have investigated the implementation process in different health contexts, such as diffusion of innovation within organisations and implementation practices in mental health and nursing.(14-16) Regrettably child safety interventions were not included in these large reviews.

There have, however, been a few studies addressing implementation issues specific to injury prevention. Brussoni et al. (2006) explored a methodology to bring together scientific evidence and practitioner experience using the case of smoke alarm installation.(9) The sustainability of community-based injury prevention interventions and the role of factors such as structure, process and context in the effectiveness of such interventions has been studied by Nilsen et al. (2004, 2005)(8, 17) Additionally, the feasibility of policy transfer for unintentional injury has been investigated.(18) A recent study by Rothman et al. (2016) explored the facilitators and enablers to enact child and youth injury prevention legislation in Canada.(19) Finally, conceptual work by Bugeja et al. (2011), addresses the research to practice

gap in injury prevention by proposing a public policy approach to injury prevention, described from the practitioner's perspective.(20)

Findings of these studies are broad, including the importance of windows of opportunity (20), resources(9, 18, 19) and the challenges of multi-sectoral working.(9)

This qualitative study aims to build upon this evidence base with a focus upon child safety in a multi-national context. The aim was to identify facilitators and barriers to adoption, implementation and monitoring of child safety interventions.

Methods

The study emerged within a large-scale European Union (EU) project: Tools to Address Childhood Trauma and Children's Safety (TACTICS).(21) The implementation process was broken down into three broad phases: adoption, implementation and monitoring of good practice child safety interventions, referred to collectively as the AIM process. These phases constitute a simplified and condensed version of the stages of implementation as described by Fixsen et al. 2005,(22) with additional emphasis on monitoring.

Definitions

By adoption, the authors refer to an explicit decision to take up an intervention. Implementation signifies action taken to put into operation an intervention including, as appropriate, enforcement activities. Monitoring denotes the collection and analysis of data for the specific purpose of examining how well an intervention is being implemented and its impact.

Data collection

Participants were invited to prepare a case study (presentation and a written account) of a good practice child safety intervention that had been implemented in their country.

To ensure broad coverage of the child safety field one of the authors (MM) developed a matrix, which was reviewed by the TACTICS scientific committee. The scope of the TACTICS project influenced the choice of injury categories due to its focus on the injury domains road, water and home safety and intentional injury prevention. To

populate the matrix, participants were asked to submit good practice interventions from their countries (good-practice as defined in the ECSA Child Safety Good Practice Guide).(2) Cases were selected by the authors of this study to maximise coverage of issues and age groups, as well as to represent the governance level of implementation (e.g., national, regional or local).

The participants prepared their presentation using a template and guidelines developed by the authors, which specifically elicited facilitators and barriers for each stage of the AIM process.

The presentations were made during two workshops that took place in Rome, Italy in October 2011 and Copenhagen, Denmark in May 2012. Each presentation was approximately 15 minutes duration. A data extraction form was used to record details of the presentations. A question and answer session, attended by all the participants and four of the authors (BS, PSB, MM and JV), followed the presentations. The aim of the question and answer sessions was to clarify any unclear details and to allow free discussion to take place. Both the presentations and the question and answer sessions were audio-recorded. Following the two workshops participants wrote up their case studies using another template and guidelines allowing them to elaborate on details of the cases.

Participants

Participants in the study were representatives from member organisations of the European Child Safety Alliance (ECSA). The participants were either partners on the TACTICS project, or individuals chosen by the project partner. Each participant represented a different country.

Ethics

Ethical approval was not sought because the scope of the study is not considered human subjects research according to the Dutch Medical Research Involving Human Subjects Act.(23) Correspondingly, the ethics committee of Maastricht University does not review proposals that fall outside this definition. Nevertheless, all participants signed a project agreement as part of an EU funded project that covered issues such as use of data and publication. Participants were informed ahead of time that presentations would be recorded.

Data Analysis

Data analysis was done in three stages. In stage one, one of the authors (BS) employed thematic content analysis(24) to analyse and code the data for statements of facilitators and barriers for each phase of the AIM process: adoption, implementation and monitoring. Phase one was concluded when all the data had been analysed and no new statements were found (data saturation). The result of phase one was a list of facilitator and barrier statements grouped to the phase of the AIM process to which they applied. Data analysis was conducted by hand and with the use of Microsoft Excel.

In the second stage of analysis four of the authors (BS, PSB, KF and MM) independently reviewed and grouped the statements into logical themes. The themes suggested by each author were then collated and harmonised, with the agreement of all the authors, into a final list of themes. The participation of the group helped ensure quality and increase objectivity.(25)

In the final phase of the analysis, four of the authors (BS, PSB, KF and MM) were asked to re-sort the statements, this time among the list of agreed themes. The author leading the analysis (BS) collated the results and where there were differences, the final content of each theme was agreed among all of the authors by consensus.

Results

Twenty-six cases from 26 countries in the WHO European Region were included in the study (Table 6.1) Cases were included from six of the seven original categories of the matrix. The planned case for child maltreatment prevention was not included, as the participant was unable to present and attend the workshop.

Data analysis was performed using three sources of data: the presentation slides, the written accounts and the notes taken during the workshop. In addition, we used the audio recordings to clarify and verify points, however they were not transcribed.

Table 6.1. The cases and countries included in the study

Injury domain	Name of intervention	Age group	Country
Road safety	National Road Safety Campaign	Pre-school and school age	Belgium
	Respect Our Signs" Croatian national Road Safety Programme	School age	Croatia
	The Safe Routes to School pedestrian safety project, Odense Municipality	School age and adolescent	Denmark
	Tax reduction on child passenger restraint systems	Pre-school	Portugal
	"Stop traffic accidents! Life has priority" Road safety campaign	School age and adolescent	Romania
Water safety	Swimming pool safety legislation	Pre-school	France
	Drowning prevention programme	Pre-school and school age	Iceland
	Promoting life jacket use	Pre-school and school age	Ireland
	National swim diploma programme "Swim ABC"	School age	The Netherlands
	Swimming school for all; training bilingual swimming teachers	Pre-school and school age	Sweden
Home Safety	"Bärenburg" (Child Safety House	Pre-school and school age	Austria
	"Safe at Home" National Home Safety Equipment Scheme	Pre-school	England
	"Beware Poisonous!" – Avoid poisoning in immigrant families	Pre-school	Germany
	Voluntary Standards for Safe Homes for Children	Pre-school and school age	Israel

Table 6.1 (continued) The cases and countries included in the study

Injury domain	Name of intervention	Age group	Country
Home Safety	Involving family doctors in child safety measures	Pre-school, school age and adolescent	Latvia
	Public playgrounds – requirements for public playground safety and their management	Pre-school and school age	Malta
	Prevention of burn injuries in Harstad	Pre-school	Norway
	National Blind Cord Safety Campaign	Pre-school	Scotland
	National home visiting programme for families with newborns	Pre-school	Slovenia
Suicide prevention	The National Suicide Prevention Project	Adolescent	Finland
	Suicide and self-harm prevention	Adolescent	Greece
Peer violence prevention	Stop Bullying: A nationwide school campaign	School age and adolescent	Lithuania
	Stop Bullying: A nationwide school campaign	School age and adolescent	Slovakia
Data and monitoring	Health behaviour in School-aged Children (HBSC) study as a potential source of monitoring	School age	Hungary
	Working with coroners to improve child injury monitoring in Catalonia	Pre-school, school age and adolescent	Spain
	All Wales Injury Surveillance System, Emergency department data collection	Pre-school, school age and adolescent	Wales

The number of facilitators or barriers identified within the case studies decreased over the three phases of the AIM process. None of the case studies identified both facilitators and barriers for all three of the phases of the AIM process. The highest number of statements occurred for barriers to adoption, which had 24 statements and the lowest was ten statements for facilitators to monitoring.

Categorisation of the statements and harmonisation of the results produced eight general themes applicable across the AIM process: management and collaboration, resources, leadership, nature of the intervention, political, social and cultural environment, visibility, nature of the injury problem and analysis and interpretation. A short description of each theme, where in the AIM process it appears and whether it was a facilitator or barrier is displayed in Table 6.2.

Table 6.2. Identified themes within the AIM process

Theme	A		I		M	
	Barrier	Facilitator	Barrier	Facilitator	Barrier	Facilitator
Management and collaboration Efficient management of whole AIM process (planning, organising, controlling resources, meeting deadlines and achieving predetermined goals. Successful collaboration; Building and maintaining partnerships, ensuring clarity among partner roles, managing large and diverse teams		✓	✓	✓	✓	✓
Resources Financial and human (adequate number and relevant skill set) resources, availability of data, time constraints	✓	✓	✓	✓	✓	✓
Leadership Formal leadership – with formal responsibility to deliver, Informal leadership – no formal responsibility but influence (i.e. champion)	✓	✓	✓	✓		✓
Nature of intervention Design of intervention, existing supporting evidence, established need, possibility to adapt to local environment, presence of pilot	✓	✓	✓	✓	✓	✓
Political, social and cultural environment Presence of supportive or unsupportive political social or cultural environment, existing laws, international or national policy agenda	✓	✓	✓	✓		
Visibility Public demand or concern about injury, media coverage, government focus on injury	✓	✓		✓		
Nature of injury problem Complexity of injury as public health issue, inter-sectoral nature, unclear location of responsibility for prevention, taboo nature of some issues (e.g. suicide), difficulties regarding data availability	✓		✓		✓	
Analysis and interpretation Difficulties encountered during data analysis and interpretation of results					✓	

Adoption Phase

The adoption phase (Table 6.3) was generally characterised by facilitators and barriers to establishing a collaborative partnership and building momentum for the AIM process. Strong leadership and commitment among project partners to the intervention was a facilitator. Participants described how taking a win-win approach to collaboration helped to maintain commitment and strengthen partnerships. The availability of resources (financial, human - including appropriate skills, time and data) was centrally important. Local data were used to assess the state of affairs and demonstrate the need for action, while comparative data highlighted inequalities or a low performance compared to neighbouring countries.

Table 6.3. Facilitators and barriers identified at the adoption phase

Themes	Facilitators	Barriers
Management and Collaboration	– Clear role of leading organisation as coordinator of partners – Commitment to the intervention among partners – Win-win approach to collaboration – Existing organiser's network – Internal collaboration among organisers and with external organisations – Organisations with good reputations	
Resources	– Availability of funding – Sufficient time – Availability of personnel with the appropriate skills – Availability of Data – Key figure or organisation providing technical skills and/or data	– Lack of funding – Lack of time – Lack of personnel – Lack of sufficiently trained personnel – Lack of infrastructure
Leadership	– Leading figure(s) with many contacts – Strong political will – Establishment of new government entity – Key figure initiating data collection – National/top-down initiative	– Local resistance to change among organisations affected by intervention – Lack of leadership among partnering organisations
Nature of the Intervention	– High quality intervention (good evidence of efficacy) – Low funding requirements – Economic incentive for enforcement – Intervention already trialled in another country or region – Intervention constituted extension of existing programme – Experience from other (comparable) countries – Integrated pre-intervention research (e.g., needs assessment)	– Pioneering a new strategy – Internal disagreement among project partners regarding aspects of the intervention (e.g., differing visions of how the intervention would be when implemented)

Aspects of the intervention itself facilitated or hindered adoption. High quality, inexpensive interventions, with good evidence of efficacy, previously trialled in other countries were easier to adopt. Interventions that constituted an extension of existing programmes and those with integrated pre-intervention research (e.g., a needs assessment) also facilitated adoption. Interventions that were completely new were more difficult to adopt.

Political and public recognition of an issue facilitated adoption. Participants described how strong media coverage surrounding even a single injury event could benefit their campaign. Equally a lack of public demand, lack of government prioritisation or local government apathy were barriers to adoption. The nature of injury as a public health issue was a challenge at the adoption stage (e.g., the need for multi-sectoral collaboration led to confusion among sectors concerning responsibility to act).

Implementation phase

Findings for the implementation phase (Table 6.4) focused on maintenance of the collaborative partnership and progression through the AIM process. Facilitators included factors promoting partnership and leadership stability (such as organised, respected, and enthusiastic partners). Routine project evaluation revealed problems and helped to solve them. A lack of evaluation was a barrier, particularly in the context of prolonging an existing intervention and learning from or demonstrating previous experience.

Table 6.4. Facilitators and barriers identified at the implementation phase

Themes	Facilitators	Barriers
Management and Collaboration	– Common understanding of long-term nature of AIM process – Co-operation with academic institution – Enthusiasm from partners – Local partnerships – Partner's network – Partners organised and respected – Routine monitoring and evaluation from outset	– Co-operation problems with existing partners – Failure by partners to meet deadlines – Internal organisational changes – Poor internal understanding of implementation – Problems establishing partnerships – Lack of clarity regarding partner roles – Resistance among partners to comply with the central scheme – Lack of monitoring
Resources	– Availability of funding – Fundraising support from local organisations – Funds allocated to media campaign – Staff training as part of scheme set-up – In kind support from professionals – Production and distribution of supporting educational materials	– Lack of funding – Lack of sufficiently trained personnel – Heavy workload or fear of increased workload – Lack of volunteers – Short time frame – Lack of data
Leadership	– Good internal leadership of consortium: central administration, support and information – Stability of key figures and personnel – Inter-ministerial co-operation – Committed champions – National/top-down initiative	– Challenges for national organisation to act locally – Policy maker misunderstanding problem – Resignation of champion

Table 6.4 (continued) Facilitators and barriers identified at the implementation phase

Themes	Facilitators	Barriers
Nature of the Intervention	– Robust intervention – Pilot phase with good results – Co-financing/co-benefits for partners – Links to other projects – Existing intervention with own resources (protocol/educational material) – No-charge nature of intervention (e.g., free equipment and fitting) – Action taken from beginning to properly address target population – Strong research base and reliable data – Compliance with intervention easy and not too expensive – Legal clarity	– Difficulties encountered when adapting intervention to setting – Large and Complex interventions – Efficacy of recommended items questionable – Voluntary nature of participation (e.g., voluntary standards) – Misunderstanding/lack of resources among enforcers – Confusion among consumers
Political, Social and cultural environment	– Change in national agenda – Better designed safety products on the market – Existing legislation	– Change in political climate – Lack of safety culture among population – Circumstances relating to armed conflict
Visibility	– Interest in safety gave rise to a new market for safety equipment – Problem addressed was widely recognised – Publicity	
Nature of the injury problem		– Taboo subject (e.g., suicide) – Relatively low number of child deaths

Availability of sufficient resources, to match the intervention (and ideally its potential evolution), was essential. Difficulties regarding funding were said to impact human resource availability due to the time investment needed to secure funds. Some human resource issues were tangible (e.g., lack of skills) and some were presented as more subjective (e.g., staff fear of an increased workload); staff training and capacity building were cited as ways to address these issues.

Changes in the political, social and cultural environment affected the implementation phase and managing these changes required a flexible and innovative approach. High visibility of the injury issue and wide publicity of the intervention (e.g., media interest and a dedicated website) was a facilitator. Additionally, the sense that the problem being addressed was widely recognised drove momentum among organisers and decision makers.

Monitoring phase

Factors affecting the monitoring phase (Table 6.5) were more centred on the feasibility of monitoring and some seemed to consider it an optional phase. Leadership facilitated monitoring if, for example, an external organisation, leader or champion required an evaluation as part of their participation. Likewise partnerships with institutions such as national research institutes or universities helped.

Table 6.5. Facilitators and barriers identified at the monitoring phase

Themes	Facilitators	Barriers
Management and collaboration	– Definition of milestones at outset – Strategic indicators put in place in business plan – Detailed project costs set-out from beginning – Mixed research methods (surveys, case studies, etc.) – Minutes/agendas of all meetings – Possible risks identified and monitored in advance – Data collected throughout scheme – Role of external company, sponsor or organisation with own evaluation requirements	– Poor coordination – Lack of process evaluation
Resources	– Infrastructure – Availability of data	– Lack of funding – Lack of personnel – Lack of sufficiently trained personnel – Lack of infrastructure – Time-consuming process – Lack of international comparator – Lack of routine data collection – No data to control for external factors – No data to evaluate change in attitudes/awareness – Short time frame of activities

Table 6.5 (continued) Facilitators and barriers identified at the monitoring phase

Themes	Facilitators	Barriers
Leadership	– Support from ministry – Evaluation requirements from external organisations	
Nature of the Intervention	– Preceding research (e.g., needs assessment during adoption phase)	– Challenges regarding accessibility of the target population for monitoring (e.g., illiteracy) – Diverse groups using intervention
Nature of the injury problem		– Nature of injury - low mortality/minor injuries
Analysis and Interpretation		– Difficulties establishing intervention effectiveness due to complexity – Comparability of results – Complexities in data treatment for (multiple user types, or data sources) – Difficult to transform data for policy making

The availability (or lack) of appropriate data was particularly relevant for monitoring. Practitioners aiming to establish a correlation between an intervention and a reduction in injury over time struggled to provide strong support using robust measures such as mortality rates. Moreover, it was said to be challenging to establish both baseline and follow-up measures for most injuries, because few countries have good data on non-fatal injuries, and minor injuries are not well captured by routine data collection methods.

Monitoring was, however, facilitated by pre-defined milestones, set project costs (including budgeting for monitoring), and integrated strategic indicators. Indicators could be continually monitored while detailed reports of milestones and project costs contributed to efforts to monitor progress. Interventions with a needs assessment (carried out during the adoption phase) also facilitated monitoring by providing a baseline of the situation before the intervention was implemented.

Discussion

This multinational study explored facilitators and barriers to the implementation process of child safety interventions. Participants presented their experiences of the AIM process and data analysis revealed eight themes: management and collaboration, resources, leadership, nature of the intervention, political, social and cultural environment, visibility, nature of the injury problem and analysis and interpretation.

Many of the themes identified were simply facilitators if present and barriers if absent. For example, resources are an advantage when present and a barrier when not. However, the discussions during the question and answer sessions that followed the presentations indicated that some of the facilitators and barriers were not independent. For instance, a well-integrated leader as part of a collaboration involving organisations with a good track record and reputation was reported to increase the likelihood of an intervention receiving funding. This was also true for barriers such as a lack of data; in one case the presence of a key individual enabled them to initiate data collection. In this sense there is interconnectedness between the themes we have identified and the facilitators and barriers contained within them. This idea is supported by findings from Nilsen et al. (2005) where they discuss the interconnectedness of factors and the dangers of focusing too heavily on single factors while ignoring others.(8)

Likewise, there seemed to be interconnections across the whole AIM process. The findings suggested that effort invested in the adoption phase appeared to pay off in later phases of implementation and monitoring. For example, building commitment to an intervention by using a win-win approach to collaboration and building a strong team early in the process appeared to contribute to other facilitators in the implementation phase, such as enthusiasm among partners, and a common understanding of the long-term nature of the process. This idea is supported by experiences in sports injury prevention(26) as well as mental health practices.(22, 27)

The AIM process also appeared to be somewhat cyclical. Participants described how demonstrated efficiency in previous interventions helped them to secure funding and support for intervention extensions and new interventions. However, many of the participants of this study did not report on the monitoring of their interventions. This was because, either, the intervention had not yet reached the monitoring phase, or, because monitoring had not taken place. This apparent lack of intervention monitoring is concerning as progress in the field of injury prevention will not be achieved without effective evaluation.(28)

Many parallels exist between our findings and the findings of implementation studies in injury prevention and other fields. The Quality Implementation Framework from Meyers et al. (2012) is based on a synthesis of 25 frameworks and refers to many of the facilitators and barriers identified over the AIM process in this study.(16) The role of, and interaction between, formal and informal leadership is explored in detail by Bryson et al. (2006) and Armistead et al. (2007)(29, 30) additionally Huxham (2003) provides a detailed overview of the management issues involved in joint working across organisations, reflecting findings such as the benefit of clear aims and roles, the need to understand the long-term nature of the process and difficulties for the collaborative partnership if a key individual is lost.(31)

Nilsen et al. (2005) elaborate on the challenge to achieve effective leadership, without relying too heavily on a single individual.(8) A possible solution to this might be found in the approach taken by Donaldson et al. (2016) to use intervention mapping as a way to create an implementation structure potentially more resilient to change.(26)

From the injury prevention literature our findings on the importance of policy windows and the benefit of national leadership are supported by several studies.(9, 19, 20) Barriers identified within the theme management and collaboration (e.g.,

challenges for multi-sector partnerships), and within the theme resources (challenge of short-term and inflexible funding arrangements) are also supported.(9)

Participant experiences contained in the theme visibility drew our attention to particularities for injury prevention among children also described by Rothman et al (2016).(19) The importance of visibility (i.e., political and public recognition) of the issue is an important aspect of implementation, particularly in multi-sectoral collaborations.(32) Participants of this study reported that emotive single injury events among children could increase public awareness of the issue. High profile cases of an injured child could be seen as an opportunity (albeit a sad one) for injury prevention practitioners to draw attention to the issue, launch an intervention or highlight the preventable nature of injury and demand action. Social media may be a useful tool in this regard.(33) In this sense the political, social and cultural environment plays a significant role in visibility. As described by Hanson et al. (2012): "science can make a difference provided that research evidence is injected into public discourse in a way that is meaningful to policy makers, politicians and the general public."(10)

Limitations

There are some limitations to this study. First, although participants were encouraged to collaborate with others involved in the intervention upon which their case study was based, this was not always possible. Some cases were presented from one person's perspective while others were delivered by someone that had not been personally involved in the intervention. In the latter case the presentation had been produced using interviews with relevant stakeholders. These issues may affect the validity of some of the facilitators and barriers identified.

Second, the level of detail in the presentations and written case studies varied. None of the case studies identified facilitators and barriers for all three of the stages of the AIM process and the number of facilitators and barriers decreased over the three phases. As a result, cases that provided a high level of detail may be over-represented in the results and the adoption and implementation phases are likely to be better explored than the monitoring phase. The lack of detail regarding the monitoring phase may be due to a lack of intervention monitoring in the injury field or response fatigue among participants as the monitoring section was the last reporting section.

The presentations and written case studies were done in English, which while the working language in the field, was the second language for most participants. This was a challenge for some and is reflected in reduced detail in the written summary of the case studies. However, the question and answer sessions did allow clarification when questions arose. Overall the consistency in facilitators and barriers identified across the interventions, which represented both different areas of child injury and the views, and experiences of practitioners working in child injury in 26 different countries suggests a reasonable level of validity.

Conclusion

This study identified facilitators and barriers to the AIM process of child safety good practice interventions. Major facilitators were effective management and collaboration, sufficient resources, a high quality intervention and receptive political, social and cultural environment. Dominant barriers were lack of resources, lack of political support (leadership), and problems surrounding building and sustaining multi-sectoral collaborations (management and collaboration). Additionally, facilitators in the area of visibility such as making use of a high media focus on a child injury event were highlighted.

To our knowledge this is the first multinational study of the implementation process for child safety good practice interventions. The findings, divided by phase of the AIM process, demonstrate the importance of each phase and provide practitioners with suggested areas where proactive planning might help increase likelihood of effective implementation.

We believe that the field would benefit from further qualitative research based on the themes identified in this study. For example, research exploring the interconnectedness between the facilitators and barriers and the themes and phases of the AIM process. Additionally looking at specific mechanisms to overcome some of the barriers and identifying strategies to capitalise on facilitators would be a welcome contribution to the field.

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Chapter 7

Discussion and Conclusion

This dissertation focuses upon the 'Research to Practice Gap' within child safety. The general reduction in child injury over the last 30 years is a great achievement. Many evidence-based interventions have been developed and widely implemented to protect children.(1) However, enduring, and in some cases widening inequalities between and within countries suggests that more still needs to be done to protect children from injury.(2) Particularly among vulnerable populations.(3)

This dissertation employed a mixture of research methods to explore the challenges surrounding the implementation of evidence-based child safety interventions across Europe in the context of the EU funded project TACTICS. The premise was that, in order to address inequalities evidence-based interventions should be implemented at different levels of government, implicating multiple sectors. This approach corresponds with recommendations from WHO Europe(4) and The European Council.(5) The research is underpinned by a conceptual framework combining three models:

First, the Public Health Approach to Injury Prevention (PHAIP).(6) This approach advocates the use of an evidence-based approach to all injury prevention activities from identifying and evaluating the problem to developing, testing and implementing interventions.

Second, the Governance for Health Framework is used to address the complexity of child injury. It describes the whole-of-government and whole-of-society approach, calling for activities to be multi-level - from local to global - and requiring actors to consider health and well-being as a social goal requiring joint action. The whole-of-society approach adds a further layer to the whole-of-government, emphasising the roles of the private sector and civil society in addition to political decision makers.(7)

Third, the Six Stages of Implementation described by Fixsen et al., is included to structure and describe the process of implementation. Implementation refers to the set of activities designed to put an activity or programme into practice.(8)

In the following section I briefly recap on the aims and findings of the three sections of this dissertation.

Section One: Exploring the multi-sectoral nature of child injury prevention

The policy tool, presented in Chapter Two, for assessing the cross-cutting nature of child injury prevention at the local level, is based upon elements of Ecological Public Health and Life-course Epidemiology. It invites stakeholders to assess the broad factors that could contribute to an injury taking place.

The assessment tool is intended for use at the local level to facilitate collaboration between diverse stakeholders by providing a standardised working framework to approach this wicked problem.(9) This focus on the local level responds to calls for inter-sectoral collaboration on the national level(5) and, in line with the whole-of-government approach, transposes it to the local level.(7)

Chapter Three presents the results of a multi-national study to explore which policy sectors are involved in child safety. Twenty-seven sectors across the four domains of child injury were identified. Of these 27, nine were identified as 'core sectors' – relevant in each of the four domains. The health sector had the most actors attributed to it accounting for 28.5% of actors.

The importance of community readiness and buy-in from partners is described in the phases of implementation by Fixsen et al.(8) The multiple sectors identified in Chapter Three could be used in conjunction with the assessment tool presented in Chapter Two to identify relevant sectors to injury domains and build a partnership at the local level.

The findings presented in Chapter Three must be interpreted with caution given the exploratory nature of the study. Nevertheless the categorisation of 28.5% of actors to the health sector may be of importance. On one hand more than 70% of actors seemed to originate from other sectors, pointing to the depth of complexity of child injury prevention. On the other hand, these findings could be interpreted to indicate the important role the health sector plays in child injury prevention – roles such as leadership, catalytic, coordinating or supportive.(10–13) Gusfield's 1989 theory seems pertinent here; he described how relatively *'easy'* problems, or those falling into the legitimate domain of certain sectors, are said to be *'owned'* by those sectors. However, for more complex or wicked problems, stakeholders may *disown* responsibility and thus ownership falls to a particular sector by default.(14,15)

In light of the findings of this dissertation it seems that if responsibility for child injury prevention has fallen to the health sector, the health sector needs to assume responsibility and coordinate an appropriate response across the breadth of child injury risk. On the other hand, the situation will vary from place to place, that is to say the roles of the different sectors will not be the same from region to region and country to country. It may be appropriate therefore to start a collaboration by inviting all relevant sectors to get 'the whole system in the room' to set up a dialogue.(9,16) This may be facilitated by the use of the model described in chapter Two – further research into the acceptability of such an approach among different stakeholders would be helpful.

Section Two: Selecting an appropriate intervention

Section Two focuses upon selecting an appropriate intervention, addressing the first stage of Fixsen's implementation process(8) and stages three and four of the PHAIP.(6) There is a focus on the sub-national level - taking into account the roles across levels of government for child safety.(7)

The Child Safety Reference Frameworks (CSRF), presented in Chapter Four, group evidence-based, child safety interventions, applicable at the sub-national level, into a policy tool. The CSRF can be used in three ways:

1. As a reference tool to inform stakeholders about possible interventions for child safety;
2. To assess existing interventions in the region;
3. To compare regions nationally, internationally or over time

Recent research has found that: local level decision makers tend to use local evidence rather than national recommendations;(17) Researchers and academics are potentially underused as sources of information by local level policy makers;(18) and community perspectives are used more frequently than evidence generated from research.(19) The CSRF could be helpful for local and regional level decision makers by disseminating and highlighting evidence within a community assessment. Furthermore, using the CSRF in conjunction with the model presented in Chapter Two may help sub-national or local level decision makers implement evidence-based interventions while remaining rooted in the community.

Chapter Five aims to draw attention to the importance of Public Health Ethics for child injury prevention. Within the frameworks applied to this dissertation, Fixsen's process of implementation describes the importance of assessing community needs and contexts.(8) Equally, Kickbusch and Gleicher describe how values and evidence are "two sides of the same coin". Policy-making is influenced by societal values and principles that define acceptable actions.(7)

The analysis of an intervention for home safety among children aged 0-5 provides an example of how stakeholders can apply Public Health Ethics to child safety in order to consider *all* aspects of the intervention – thereby ensuring the intervention is both 'good' and 'right'.

In conclusion, it was suggested that ethical aspects should be included in the evaluation of child safety interventions to nourish the evidence base beyond efficacy, as is beginning to be the case in health technology assessment.(20)

Section Three: Putting Interventions into Action

Section Three addresses facilitators and barriers to the processes of adoption, implementation and monitoring of child safety interventions. Through a multi-national, qualitative study eight themes were identified:

Management and collaboration;

Resources;

Leadership;

Nature of the intervention;

Political, social and cultural environment;

Visibility;

Nature of the injury problem and

Analysis and interpretation.

The results shed light upon the complexity of the *process* of implementation. In practice these findings could be used by practitioners to avoid or manage obstacles and build in factors to improve implementation quality.

There have been few studies on the process of implementation within child injury prevention but many of the results presented were supported by existing literature

reporting implementation in other fields.(21) Among the findings, and others presented in this dissertation, such as multi-sector involvement, the more complex challenges for injury prevention seem to be collaboration and leadership. Additionally, a lack of resources (financial and human) dedicated to injury prevention was described by participants. The imbalance between the burden of injury and the resources dedicated to prevention activities is frequently described in the injury literature.(13,22,23) These results support calls for greater investment in injury prevention in terms of financial resources but also competent and experienced human resources.(24)

In the following section I discuss some of the perspectives of the research presented in this dissertation and how these findings could be taken further. This is followed by a section reflecting upon the role of the European Union (EU) in child injury prevention.

Major themes and future perspectives

Promoting multi-sector collaboration for implementation

The results of this dissertation point to a complex scene. Child injury is already distinct from adult and adolescent injury, some may argue that this is warranted given children's particular vulnerability. However, child injury does not seem to be systematically integrated into child health, in practice,(23) or as a general field of study either,(25) though calls for this are emerging.(26) The topic of child injury is also split into unintentional and intentional injury (although calls have also been made to bring intentional and unintentional injury prevention together – given the common social, economic, political and environmental determinants.(27,28) Beyond intention, injury is further divided into different domains road, home, water, maltreatment, inter-personal violence and so on.

The findings presented in this dissertation point to the need for multi-sectoral action, as advocated by the WHO for several decades.(29,30) However, multi-sectoral collaboration is challenging at the best of times, in such a divided field it is likely to be even more so. Identifying co-benefits between sectors could help address collaboration challenges as advocated by work in the field of health in all policies.(31)

Co-benefits could be explored from interventions originating in child injury prevention leading to additional benefits for other child health issues, other age

groups, or, issues outside public health.(32) Additionally, broader public health interventions or interventions originating from outside the health sector could have an impact on child safety.(33)

Child safety interventions could have co-benefits for other age groups: First: there could be benefits for elderly people of a programme for safe routes to school. Similarly bicycle paths separated from the road would likely benefit all age-groups. Second: interventions for child safety could have benefits for other areas of child health. For example, swimming lessons, could contribute to obesity and overweight prevention strategies. Third: interventions for child safety could lead to co-benefits for issues outside public health(32) such as an impact on localised air pollution due to an increase in walking or cycling.

The complexity of risk and protective factors for child injury may lead to benefits for child injury prevention due to interventions addressing *other* health issues. For example, interventions addressing parental substance-abuse could have an impact on child safety.(34)

Interventions falling outside the scope of the health sector could also have co-benefits for child safety. For example, urban redevelopment to improve public green spaces and playgrounds, could lead to increased physical activity, diminished depressive symptoms(33) and financial savings for society.(35)

A systematic analysis of potential cross sectoral co-benefits related to injury prevention would, in my view, be a valuable addition to the literature. However, this would need to be generated in a meaningful way for multiple sectors.(36) Further work could also be done to include child injury incidence indicators within evaluations of interventions for other health issues such as maternal mental health or addiction. This could also be extended to issues that fall outside the health sector such as education and employment.

Implementation of child safety interventions

The six stages of implementation by Fixsen et al.(8) is one of the conceptual frameworks underpinning this dissertation. The findings from the field of child safety indicated that the implementation process in child safety is broadly comparable with other fields – in terms of facilitators and barriers. However, despite the parallels, deeper research into the particularities of the implementation process in the context of child safety could be of great value for researchers and practitioners.(32) Our

understanding of different aspects of implementation is growing and exploring and applying state of the art concepts to child injury prevention could improve implementation quality. This could lead to a positive impact upon effectiveness and sustainability of interventions.(37)

For example, the issue of intervention adaptation – to ensure that the intervention is adapted to the community - described in detail by Damschroder et al.,(38) could be explored further. Identification of core (indispensable elements of the interventions) and adaptable components of injury prevention interventions could be helpful for decision makers.(38)

In addition to a deeper understanding of core and adaptable components of interventions, a clearer view of the role of the sectors implicated in the implementation of child injury would be helpful. This could include how these roles change depending upon the issue at hand and the level of governance at which implementation takes place. Furthermore, it would be particularly important to explore the role and potential conflict of interest of the public, private and non-profit sectors.

The role of the European Union in child safety

The funding for this work was provided by the EU and the progress made during the project demonstrates an impact the EU can have on child safety.

Beyond funding research, the EU plays a significant role in child safety through action such as regulating manufacturing standards, capacity building and promoting cross border learning and exchange of best practice. Mechanisms employed by the EU, such as structural funds, allow it to transcend the national level and play a positive role in the regional and even local levels.(39) The model of EU funded cross-border projects could further contribute to cross-border diffusion of innovation and learning. This could be particularly advantageous if cross-sectoral collaboration were promoted and elements built in to promote sustainability of the results.(40)

Coordination of multi-sectoral collaborations is demanding, time-consuming and therefore costly.(36) The EU could recognise this challenge within injury prevention and play a role by supporting the operational costs of supra-national, multi-sectoral organisations working on injury prevention.(41)

The challenge of fitting implementation into a short-funding-window was identified in Chapter Six. More research could be stimulated by EU funding mechanisms to accommodate some of these challenges. A further challenge for practitioners is to demonstrate intervention effectiveness over a short period of time - particularly difficult if co-benefits amongst other sectors are included as a measure of effectiveness. Extending the period of time funding is available might facilitate evidence generation across sectors.

Finally, setting targets for injury reduction is an important element of policy making and measuring progress. The European Council has recently endorsed the Valletta Declaration, committing members states to the target to halve the number of road deaths in the EU by 2020, and also, to halve the number of serious injuries by 2030.(42) This type of agreement could be a policy push for national governments to renew their focus on road safety – an important facilitator to implementation as described in Chapter Six. In the future there may be scope for similar targets for other injury mechanisms.

Limitations

The methodological limitations of each study that make up this dissertation are discussed within each chapter. In this section I elaborate upon broader limitations regarding the scope of the dissertation.

Local assessment of needs and community engagement – the first stage of the Fixsen model – is under developed in this dissertation.(8) Although, the results presented in Chapter Five recognise the importance of local partnerships and the value of an initial needs assessment the dissertation does not investigate this further. This is an indispensable part of successful and sustainable implementation(43) and its absence is therefore a limitation of this dissertation. Further research on the topic could be based upon the seminal work by Arnstein in 1969, the ladder of citizen participation(44) to explore the impact and mechanisms of citizen engagement and partnership upon implementation and consequently safety.

The Public Health Approach taken in this dissertation projects a particular ‘picture’ of the issue and solutions. It is influenced by the conceptual frameworks underpinning the research and the expertise and training of the author. Given the multi-sectoral nature of the issue at hand the subject could have been addressed through the lens of a number of academic disciplines. Political scientists, engineers, town planners,

experts in local government or architects may have approached the issue differently and drawn different conclusions. It would be hugely beneficial and informative to discuss these results in a cross-disciplinary forum to maximise the comprehensiveness and utility of the results.

It was not possible within the scope of this PhD project to test the policy tools presented and this is a limitation of the research. Using the results generated, concerning the implication of multiple sectors, facilitators and barriers experienced and the ethics of injury prevention to test the presented policy tools would add value to this dissertation. This could be addressed in a further project.

Conclusion

The broad aim of the dissertation was to explore the space between research and practice in the field of child safety, with the intention to identify ways to address, national and international inequalities in injury rates. Weakness in structural factors such as leadership, inter-sectoral coordination and capacity may contribute to a poorer performance in injury prevention in some countries, thereby exacerbating inequalities.(2,24) Success stories such as the multi-sectoral approach to road safety taken by Sweden in their Vision Zero campaign indicate the great potential for improvements by working in a multi-sectoral way.(45)

This dissertation primarily addresses the process of implementation for evidence-based child injury prevention interventions within the context of a whole-of-government and whole-of-society approach to health governance. Tools are proposed to help decision makers identify and explore the problem and choose an appropriate intervention. The findings demonstrate the multi-sectoral nature of child injury prevention and the facilitators and barriers to adoption, implementation and monitoring.

In conclusion, implementation in child injury prevention seems to be complex, multi-sectoral and challenging. In order to bridge the research to practice gap and tackle national and international inequalities multi-sectoral partnerships will be required. Moreover, issues such as capacity and resource availability will need to be addressed. Capitalising upon the expertise, experience, and motivation of multiple-sectors is likely to lead to greater progress than working independently.

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Valorisation

The context: past and current

The context within which this dissertation took place is relevant when considering 'added value' as much of the work was undertaken as part of the European Union funded project TACTICS (Tools to Address Childhood Trauma and Children's Safety). The TACTICS project was funded within the 2nd health programme from DG SANCO (2010-2013). The call specifically focused upon capacity building and the development, implementation and monitoring of best practices in high need areas to address health inequalities, with a particular focus on vulnerable groups such as children. A clear need for this form of focus and action had, therefore, already been identified at the supranational level - to which this project responded and was eventually financed. The project built upon previous EC recommendations,(1) projects and strategies concerning child health and safety.(2,3)

Since 2014 many themes and determinants related to the occurrence of injury and its prevention have been integrated into large scale global, regional and local strategies. On the global level the UN sustainable development goals is a powerful agenda. Four of the 17 goals address injury determinants, in particular; goal 3 (Ensure healthy lives and promote well-being for all at all ages; goal 10 (reduce inequality within and among countries); goal 11 (sustainable cities and communities) and goal 16 (peace, justice and strong institutions).(4) Within the European Region the objectives of the WHO European Region health 2020 strategy also address overarching objectives relevant to injury prevention of health inequalities and good governance.(5) A positive example of action at the local level is the 2018 Copenhagen Consensus, a WHO healthy cities initiative. The strategy is bringing together city mayors across the European region aiming towards a transformative approach for safe, inclusive, sustainable and resilient societies.(6)

These examples of concrete strategies are encouraging signs that relevant science-based action is taking place at all levels of governance – with active participation of political leaders. Although the focus is not always explicitly on injury reduction the overarching themes and co-benefits of action on other social and environmental determinants will likely filter down to positively impact the field of injury prevention.

Perspectives

The objective of this dissertation was to explore the space between research and practice with the overall objective to develop tools that could support a greater

uptake of evidence based child safety interventions. It is my view that the tools presented will be of value to injury prevention practitioners when examining the issue, selecting, and implementing interventions. Nevertheless there is a great deal of work to do to further explore the process of implementation within injury prevention and examine in detail certain elements. Two aspects come to mind:

Implementation science

The first is to widen the use of concepts developed within implementation science to promote active strategies to support political will in injury prevention. The field of implementation science has been developing steadily over the last 10 to 15 years. It has produced theories and concepts that have enabled us to understand the reasons good, evidence-based ideas fail in the real world, due to implementation failure or, lower than expected impact.(7) In this dissertation I employed theories and concepts from implementation science which, to my knowledge, represents one of the first times such concepts had been applied to injury prevention in the scientific literature. By applying the wealth of evidence and thinking from implementation science to injury prevention I believe we stand to make important leaps forward.

The challenge remains, however, to extract and transfer this thinking and conceptual work from the pages of academic journals into the action plans of local, regional and national level policy makers. Policy makers need high quality scientific insights not only concerning the proposed intervention but the implementation process as well.

Collaboration

The second aspect is the focus on multi-sector collaborations. The recent systematic review on the impact of adverse events in childhood on later life draws our attention to the interconnectedness of childhood experiences; their own safety, the safety of their parents, and the environment in which they grow up.(8) Though the focus of this dissertation has been upon children, and predominantly unintentional injury, many synergies exists between unintentional and intentional injury (9); injury prevention and other health issues (10) and wider societal issues such as poverty (11) and climate change.(12)

In this dissertation we identified the multiple sectors relevant to child safety fitting a small piece of the puzzle to help policy makers bridge these sectoral distinctions. A future perspective for this aspect of injury prevention could be to systematically

exploring the inter-connectedness and overlap of each sector's remit and within that the potential for cross-sectoral co-benefits.

There is also scope to bridge these two aspects. Implementation science has hitherto been mostly focused upon the process within institutions. It is somewhat weaker when concerned with complex multi-partner collaborations. A valuable contribution for injury prevention (and no doubt other fields) would be to bridge this gap and explore elements of implementation science within collaborative working. Exploring the layers of complexity within the process of implementation when working in a multi-sectoral, often multi-layered context could provide valuable insights.

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Contribution of the author to the published papers.

Chapter 2: Beatrice Scholtes (BS) developed the idea for the tool and all authors contributed to the design. BS led the drafting of the paper and all authors were involved in revising it and approving the final version.

Chapter 3: The data for this chapter was generated within the TACTICS project and the decision to use the organigraph method was taken during the elaboration of the project, building upon a previous project, Ben II. In collaboration with Peter Schröder-Bäck, BS participated fully in data collection and analysis and it was her idea to extract these data from our results for the publication. BS led the drafting of the publication and the co-authors commented and reworked the draft before submission and during the publication process.

Chapter 4: Child Safety Reference Frameworks was a work package of the TACTICS project that was led by BS under supervision of Peter Schröder-Bäck. BS conducted the literature review – developed and applied the search strategy and inclusion criteria and undertook the process of categorizing the papers and extracting the results. BS adapted the framework from a previous study to fit the needs of child safety and led the drafting of the publication. The co-authors commented and reworked the draft before submission and during the publication process.

Chapter 5: The idea and need for an ethical analysis within the field of injury prevention in Europe (as presented in chapter 5) was discussed between BS and Peter Schröder-Bäck during TACTICS meetings. BS and Peter Schröder-Bäck worked on the concept together. BS wrote the paper and Peter contributed.

Chapter 6: The data for the paper on facilitators and barriers for adoption, implementation and monitoring of child safety interventions was generated during the project. The idea for the study was foreseen in the TACTICS project proposal. BS participated fully in planning and executing the study she developed the data collection grid and conducted data analysis leading the process of coordinated consensus building during the thematic analysis. BS drafted the paper and the co-authors participated in revising the manuscript during the publication process.

Summary

Introduction

Although average injury rates are decreasing, large inequalities continue to exist between countries within the European Union. Mortality rates from injury for children aged 0 - 19 in Lithuania in 2014 were 19/100,000 whereas in Spain the rate was 4/100,000. Within countries the picture is mixed and children's injury risk is related to factors such as their socio-economic status, the education level and employment status of their parents. The impact of these factors means that important inequalities exist.

Better prevention of child injury is thus needed to address inequalities; however, it is a multi-sectoral undertaking. Risk factors transcend generations and are multi-faceted: social; environmental and economic. This complexity has led many to describe child injury as a wicked problem – a problem for which there is no single solution, and efforts to solve an aspect of the problem can lead to further complications and challenges. Responsibility for addressing risk factors transcends traditional policy sectors. Action also occurs at multiple levels of governance; from local action to initiatives at international (European or global) level. Furthermore, injury prevention requires participation from the public and private sector and from civil society.

This dissertation explores the space between research and practice, focussing upon facilitating positive action by stakeholders to address injury among children in Europe. The objectives of the research are to explore the facilitators and barriers during the implementation process, to identify the different policy sectors implicated in child safety, to assess potential ethical considerations and finally to provide tools to help policy makers to assess their local situation and find solutions.

Method

The dissertation focuses on four domains of child injury: road; water and home safety and intentional injury prevention. Data collection for chapters three, four and six occurred between 2011 and 2014 within the framework of the EU funded project; 'Tools to Address Childhood Trauma and Children's Safety' (TACTICS). Participants were also involved in the TACTICS project and came from 27 countries of the WHO European Region. Chapters two and five are based on literature reviews conducted outside the framework of the TACTICS project.

The theoretical underpinning of the dissertation is based first: upon the Public Health Approach to injury prevention from Sleet et al, that underlines the importance of both an evidence-based approach and evidence-based practice within injury prevention. Second: the governance for health framework by Kickbusch and Gleicher which proposes the whole-of-government and whole-of-society approach to effective health governance. Third: the six stages of implementation proposed by Fixsen et al. theoretically guides the process of implementation.

A combination of research methods was used throughout. Literature reviews guided the direction of the dissertation and informed the content of the models and tools proposed. Quantitative and qualitative data was generated to identify the different sectors implicated in child injury prevention. A public health ethical framework was applied to an existing child safety intervention to explore ethical considerations. Finally, qualitative data was analysed using thematic content-analysis to explore the process of implementation.

Results

A practical tool for use at the local level to address the cross-cutting nature of child injury prevention was developed. The tool is based on Haddon's matrix and takes a life-course approach to injury prevention. It was developed for use by multi-sector stakeholders at the local level to better understand the complexity of child injury and develop multi-sectoral solutions.

Twenty-seven different policy sectors were found to be implicated in child safety. Of these 27 sectors nine sectors were identified as 'core' sectors:

Education;

Health;

Home Affairs;

Justice;

Media;

Recreation;

Research;

Social/Welfare Services and

Consumers

Core sectors were considered applicable across the four domains of child safety studied.

Child safety reference frameworks (CSRF) were developed for use at the sub-national level. CSRF, can be used to inform policy makers about possible evidence-based child safety interventions, to assess the state of affairs in the region and to compare the situation regionally, nationally, internationally or over time.

An ethical assessment of an intervention for child safety in the home highlights the relevance of public health ethics to child safety interventions.

A thematic content analysis of facilitators and barriers for the adoption, implementation and monitoring of child safety interventions resulted in the identification of eight themes found to be applicable, to varying degrees throughout the three phases of the process.:

Management and collaboration;

Resources;

Leadership;

Nature of the intervention;

Political, social and cultural environment;

Visibility;

Nature of the injury problem and

Analysis and interpretation.

Conclusion

The findings demonstrate the multi-sectoral nature of child injury prevention and the challenges of implementation within an issue of such complexity. Despite the challenges, there is un-doubted scope for stakeholders at the local and regional levels to take positive action. There may be opportunities for different sectors to find cross-sectoral co-benefits, within and outside the field of child injury prevention and beyond public health.

Future perspectives should embrace the multi-sectoral nature of injury prevention. Further research could focus upon a systematic analysis of potential co-benefits linked to injury prevention, to quantify the breadth of impact of individual interventions and incentivise their implementation across sectors.

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This dissertation would not have been possible without the guidance and support of those I am lucky to have around me.

Peter

I am deeply grateful for your endless patience and gentle, sensitive, but persistent guidance. Our work together on the Tactics project was very formative for me. I learnt an enormous amount about all sorts of things and enjoyed the experience immensely. When I look at this book I am very proud of what we managed to achieve during that time. Thank you for your responsiveness, honesty and pragmatic vision over the years, I consider myself very lucky to have had such a committed co-supervisor.

Helmut

Thank you for the opportunity to work in your department and to bring this PhD to fruition. I appreciate immensely the guidance and vision you provided and the belief you had in me.

Joanne and Morag

Thank you for everything you taught me during the Tactics project. I learnt so much, not just about injury prevention but also project management. Thank you for such deep and thoughtful revision of my papers - the discussion back and forth of the drafts was very informative, this dissertation would not have had the depth of thought or quality without your participation.

Anita

Thank you for your detailed follow-up of my slow progress and your invaluable help and support through these final months of administrative hurdles. It is so reassuring to have someone so responsive and kind at the end of the phone or email.

Maastricht colleagues

Thank you for your patient listening and constructive comments on papers I presented, ideas I had, problems I encountered etc., it was inspiring working with you. I only wish that I had been a bit more present and a bit less distracted by pregnancies and babies to have been able to make the most of what was, now I look back, a relatively short period time. Nevertheless, I feel that we have a very strong connection, no doubt we will be reunited at a EUPHA conference in the coming years.

Liège Colleagues

Thank you for the warm welcome to the department and your patience with my less-than-perfect French and my occasional need to juggle old and new projects. I have really enjoyed the past 18 months getting to know you all and getting to know public health from a very different angle. I look forward to the coming years with anticipation. Many thanks in particular to my office colleagues Axelle, Iness, Bernard and Nathan for your helpful and encouraging words, particularly at the end of this sometimes stressful process.

Friends and Family

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Fabienne and Isabel

Thank you for the demonstration (in real time) of the sanctity of childhood and the challenges and responsibilities of parents and society to preserve and protect the most vulnerable. You have taught me so much in your short lives, not only on the personal and family level (nappy changing, car seat installing, managing fancy dress at short notice), but also the great role children play in our societies.

Studying child injury prevention while watching you develop and grow has been very special. You have helped me develop a deeper and more nuanced understanding of the simultaneous challenges of protecting children while giving them freedom to explore their world and build their own resilience.

Curriculum Vitae

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Date of Birth – 7th September 1983

Professional Experience

November 2016 – present:	**Researcher and Teaching Assistant,** Department of Public Health, University of Liège, Liège, Belgium (INTERREG project *APPS* 'Patient Partnership Approach in Healthcare')
July 2016 – December 2016:	**Project Coordinator,** Liège University Hospital, Liège, Belgium
November 2015 – October 2016:	**Teaching Assistant,** Department of International Health, University of Maastricht, Maastricht, The Netherlands
April 2015 – November 2015:	**Researcher**, Department of Health Ethics and Society, University of Maastricht (Horizon 2020 project *Euro Healthy*)
August 2011 – April 2014:	**Researcher**, Department of International Health, University of Maastricht (EU funded project *TACTICS* 'Tools to address childhood trauma, injury and children's safety')
November 2010 – April 2011:	**Student Assistant**, Department of International Health, University of Maastricht
Nov 2007 – November 2009:	**Training Course Coordinator**, European Association of Neurosurgical Societies (EANS)

Qualifications

May 2014 – present:	**PhD Public Health,** Department of International Health, University of Maastricht *The 'research to practice gap' in child safety: tools to promote the implementation of evidence based practice in Europe*
September 2010 – July 2011:	**MSc European Public Health,** University of Maastricht
September 2003 – July 2007:	**BA Middle Eastern Studies with Arabic**; University of Exeter, United Kingdom

September 1995 – July 2002:	**GCSE, AS and A levels**; Farmor's School, Fairford, Gloucestershire, United Kingdom

Training Courses

July 2013:	**Health and Society Summer School on the Social Determinants of Health;** Department of Epidemiology and Public Health, University College London, London, UK
September 2011:	**International Training Workshop on Health and Environmental Changes in Mega Urban Areas**; Institute of Geographic Science and Natural Resources Research, Chinese Academy of Sciences, Beijing, China
September 2010 – January 2011:	**Multilevel analysis of longitudinal data;** University of Maastricht
January 2010 – August 2011:	**Methodology, Techniques and Statistics**; University of Maastricht

Academic Activity

- Reviewer for Injury Prevention and the International Journal of Health Policy and Management

Skills and other activities

- IT skills with Apple and Microsoft (Powerpoint, Word, Excel), SPSS, Reference managers (Endnote, Bookends, Mendeley)
- January – August 2010: Volunteer, Hôpital Notre Dame and McGill Hospital, Montreal, Canada
- Teaching English as a Foreign Language qualification (TEFL Paris 2007)

Languages

- English (native speaker), French (advanced), German (beginner)

Publications

Peer Reviewed Journal Publications

Scholtes B, Schröder-Bäck P. (2017). Ethical considerations for the design and implementation of child injury prevention interventions: the example of delivering and installing safety equipment into the home. *Inj Prev*. doi: 10.1136/injuryprev-2017-042542 (Epub ahead of print)

Scholtes, B., Schröder-Bäck, P., Mackay, M., Vincenten, J., Brand, H. (2017). Child Safety Reference Frameworks: a Policy Tool for Child Injury Prevention at the Sub-national Level. *Central European Journal of Public Health*, 25(2), 120–128. https://doi.org/10.21101/cejph.a4477

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Rotter T., Popa D., **Riley B.**, Ellermann T., Ryll U., Burazeri G., Daemen, P., Peeters, G., Brand, H. (2012) Methods for the evaluation of hospital cooperation activities (Systematic review protocol). *Syst Rev*, 1(11) doi: 10.1186/2046-4053-1-11

Conference Presentations

October 2015: **Eurosafe** annual conference, Milan, Italy Oral presentation (invited speaker) 'Inter-sectoral action for Child Injury Prevention: which sectors to involve?'

March 2014: **International Conference on Urban Health**, Manchester, United Kingdom

- Oral presentation 'Mapping inter-sectoral cooperation for injury prevention: experiences using the Organigraph methodology'

November 2013: **European Public Health Conference**, Brussels, Belgium

- Oral presentation 'Promoting and hindering factors for the adoption, implementation and monitoring of child injury prevention: investigations using a case study approach'
- Oral presentation "Reference frameworks to assess uptake of child injury prevention measures at the regional level" (on behalf of Helmut Brand)

September 2013: **Public Health England Annual Conference**, Warwick, United Kingdom

- Oral presentation 'Promoting and hindering factors for the adoption, implementation and monitoring of child injury prevention – Investigations using a case study approach'

October 2011: **4th International Workshop on Health and Environmental Change in Mega-Urban Areas**, Beijing, China

- Poster presentation 'child injury – an enduring concern in the context of climate change'

Project Reports

Scholtes, B., MacKay, M., Schröder-Bäck, P., Vincenten, J,. Brand H. (2014) Facilitators and Barriers for the Adoption, Implementation and Monitoring of Interventions for Child Safety - Final Report for the TACTICS Project. Birmingham: European Child Safety Alliance.

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