OPENING THE BLACK BOX OF COMMUNITY-BASED INJURY PREVENTION EFFECTIVENESS PROGRAMMES

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Studies
A PhD student presenting a dissertation is often asked to briefly explain who the person behind the thesis is, to provide a context for the work. It is a relevant question, as no knowledge is produced in a vacuum. It is my belief that our personality traits and life experiences shape the type of research we do and the questions we pose. So, then, who am I and why have I chosen to conduct research on community-based injury prevention?

The origins of the journey undertaken to complete this thesis lie in my decision to take up studies again in 2001, at the advanced age of 40. I had been working independently since graduating from Stockholm School of Economics in 1985, pursuing a career writing about rock music (biographies on artists like Prince, Iggy Pop, and David Bowie) and providing consultancy services in the area of human resource accounting. However, after 15 years of often solitary work, I was probably entering some sort of midlife crisis. Or was it merely boredom and a desire for change? Whatever the motivation, I began studies in systems development at Linkoping University in 2001, having moved here from Stockholm with my wife in 1991. I guess one of my teachers, Vivian Vimarlund, at the Department of Computer and Information Science (IDA), was sufficiently impressed with my master’s thesis to propose a research position. There was only one problem – the lack of funding. Still, when Vivian was asked by Kent Lindqvist if she knew someone who could help him shape a guide on health economics for use among injury prevention programmes, she recommended me. Not unexpectedly, Kent did not have funding available for more than a few months. A future as a researcher seemed uncertain, as it indeed still does, to a certain extent, considering the short-term nature of most employment contracts in this field. Still, financing was secured from National Rescue Services for a three-year period, beginning January 1st 2004 and Kent became my supervisor.
The research contained in this thesis has been conducted during an intense two-and-a-half-year period. This may seem an awfully short time to develop knowledge of any importance. This may appear even more the case when one considers that my background is completely devoid of any injury prevention work. Indeed, when I was told that my research would probably involve something called Safe Communities, I immediately thought of gated neighbourhoods of high-value properties with closed perimeters of walls and private security guards – that was the extent of my knowledge in 2003. However, such innocence may not necessarily be a disadvantage. In fact, I think there are many advantages to be gained from entering a research field without too much prejudice or personal bias regarding how things “should” be. A newcomer may formulate different research questions than a person who has been active in the field for many years. Also, long-term experience in a particular field may not always coincide with the curiosity, creativity, scepticism, and commitment to hard work required to be a good scientist. Certainly, it is not always the number of years one has been active in a field that ultimately determines the level of knowledge contribution.

Research in a highly interdisciplinary field such as injury prevention benefits greatly from researchers who have been trained in different areas. During my injury prevention research journey, it has never ceased to amaze me how much use I have had for knowledge, theories, and models from my past studies and work experience. As an economics student, I spent the final year studying attitudes and behavioural change in relation to marketing. As behavioural science is considered one of the three pillars of injury prevention (the others being epidemiology and biomechanics), this background was very helpful when scrutinising the behavioural strategies and measures that are an important part of injury prevention programmes. Furthermore, my economic studies encompassed a great deal of organisational theory, which has been very useful when investigating the organisation and function of the injury prevention programmes under study. Occupational health and safety was an important aspect of my work as a consultant, as I developed and applied methods to identify and
calculate costs and effects related to absenteeism and personnel turnover as well as psychosocial and physical workplace improvements. I also developed tools to identify and evaluate conditions for organisations to accumulate and develop individual and collective knowledge necessary for long-term success. This interest in developing and applying models and frameworks to provide explanation continues to this day and is probably evident from my thesis. When I studied systems development, I wrote my master’s thesis on the importance of recognising and measuring intangible resources (including knowledge) for IT organisations. I found many similarities with community-based programmes, as these are highly dependent upon intangible resources such as leadership skills, knowledge-sharing by programme collaborators, and stable relationships with the stakeholders. Furthermore, studies in systems development involved examination of the ISO (International Standard Organisation) and other accreditation organisations, which gave me a frame of reference for the network of designated WHO Safe Communities.

My first impression of the injury prevention field was some scepticism about the value of evaluations that merely established whether programmes worked or not, often with more or less well-founded speculation as to how and why the results were achieved. I soon learned that these evaluations were labelled “black box” evaluations and that my criticisms were shared by many international researchers. So the mission was clear to me early on in the research process – I wanted to address why and how community-based injury prevention work. Many earlier Scandinavian dissertations focused on specific programmes (e.g. Lidköping, Falköping, Motala, Sollentuna, and Harstad). My ambition was to cast a wider net and approach the subject from a more general perspective. I wanted to do this by conducting studies across different programmes in order to accumulate generalisable knowledge contributing to improved understanding of why and how these programmes work.

I was also disenchanted with the label “safety promotion” that some put on these injury prevention programmes, since I felt this meant that
safety was equated with (reduction of) injuries, i.e. the critically important subjective dimension of safety was ignored. One of the first studies I conducted dealt with the safety concept and the need to consider both objective and subjective safety in order to achieve enhanced safety (this study is referred to in the thesis framework). I also began to acquire a better grasp on community-based injury prevention by conducting two systematic reviews of programmes evaluated in the scientific literature. One of the reviews focused on the results and explanations for these (study A) and the other dealt with the challenges associated with evaluating these multifaceted programmes (referred to in the thesis framework). My next research project was an interview study that discussed factors hindering and facilitating sustainability of Swedish community-based injury prevention programmes (study C). This study was important for me, as it provided a deeper understanding of the working conditions of these programmes.

When I more actively began pursuing the “why” question, I conducted two studies that analysed some of the so-called success factors of the literature on community-based injury prevention. Being a die-hard sceptic, I was not so sure these well-established “truths” were in fact the essential components the literature made them out to be, as I felt empirical evidence was lacking. One study examined the goals and decision-making basis of community-based programmes (study D), while another investigated the use and utilisation of injury surveillance data (study E). As one (anonymous) peer reviewer commented on the latter, “While there are a plethora of studies evaluating the validity of injury surveillance data and similar number of opinion pieces arguing which type of data is best, few studies address the critical issue – does injury surveillance data get collected, processed and disseminated in a way that makes a difference to the communities in which the data is collected?”

As I immersed myself even further in the world of injury prevention, I realised that the problems of identifying convincing evidence of programme effectiveness could have to do with the underlying
assumptions of the community-based model. To some extent, the
WHO Safe Community network seemed to me an idealistic movement
based on enthusiasm and commitment rather than solid theory. I had
not seen a systematic organisation of the body of knowledge on the
community-based model. Thus, I set about delineating the implicit and
explicit assumptions to scrutinise whether they were supported by
experience and empirical evidence (study F). I also recognised certain
shortcomings in existing frameworks/models that describe how injury
prevention programmes work, which led to the construction of a
conceptual/evaluation model (study G). The model seeks to synthesise
knowledge about multifaceted injury prevention programmes in order
to provide an improved structure for evaluating these complex
programmes.

For the last study of this thesis, I was able to obtain injury data
pertaining to the 14 Swedish municipalities designated WHO Safe
Communities (study B). This was an important study, I felt, as it was
the most comprehensive evaluation yet of community-based injury
prevention programmes, both in terms of the number of programmes
under study and the time periods (1987-2002) for which injury rates
were noted. While empirical research generally should not look to
verify hypotheses, but rather should refute them, this study did confirm
the pattern that had emerged from my previous studies and some of the
international literature on community-based health and safety
programmes – there is inconsistent but generally quite weak evidence
for the effectiveness of these programmes. This conclusion points to the
importance of conducting more research to answer the “why” and
“how” of community-based injury prevention. However, to paraphrase
a famous painter, I cannot expect my research to provide all the
answers – only hope that I have asked the right questions.

An important aspect of my research journey has been to establish and
maintain collaborative relationships with many injury prevention
researchers and practitioners around the world. Collaborating with
people in the US, Canada, Australia, and New Zealand has facilitated
more of an international outlook on community-based injury
Some of the earliest community-based injury prevention programmes were implemented in Sweden and many early efforts were associated with tremendous success, which likely has contributed to the model’s popularity here. However, I have found that the community-based model is far more controversial outside Scandinavia, with some international critics arguing that the model appeals to governments because it presents them with an opportunity to abdicate responsibility by letting local programmes take the blame if safety does not improve.

This journey from ideas to publication has had its ups and downs but mostly been very enjoyable. I would like to acknowledge the many people with whom I have had the privilege of working and exchanging ideas in relation to research (and life in general). My gratitude is owed to a number of people who have made this undertaking both possible and fun: supervisors Kent Lindqvist, Lennart Nordenfelt, and Toomas Timpka; research friends and colleagues Felicia Gabrielsson-Järhult, Diana Stark-Ekman, Agneta Kullberg, Preben Bendtsen, and Michael Bourne; co-authors Robert Ekman, Carolyn Coggan, and Linda Ryen; the ASP research group members Cecilia Nordqvist, Marika Holmqvist, Kjell Johansson, Agneta Andersson, Lena Linde-Söderlindh, and Matti Leijon; fellow Social Medicine and Public Health Science department researchers and administrators Kajsa Rothman, Birgitta Larsson, Peter Hjalmarsson, Elaine Sjögren, Marie Gustavsson-Holmström, Karin Borg, Nadine Karlsson, and Susanne Kvarnström; “forskarsskolan” members Gunilla Larsen, Gabriella Graspemo, Eva-Lill Nilsson, Pia Odman, Jenny Alwin, Lena Strindlund, and Thomas Davidsson; injury prevention researchers and practitioners Barry Pless, Dawn Vallet, Sherry Elnitsky, Marie Hasselberg, Moa Sundström, Peter Rothe, Pierre Maurice, and Björn Nygaard. Thanks to Aaron A. Sikkink for help with the cover and figure 4, and to Gabriella for help with some of the other figures. And lastly, but certainly not least, thanks to Elisabeth, Samuel, Isabella, and Gabriel for being there.
Abstract

Despite wide application of community-based programmes to prevent injuries and promote health over the last 25 years, there is a paucity of evaluations from which to obtain evidence regarding the effectiveness and critical factors contributing to achieving effectiveness of these programmes. Research on community-based injury prevention programmes thus far has been driven by the question “does it work?” Many programme evaluations have been characterised as “black box” evaluations, with inadequate information about the intervening and contextual factors that mediate the relationship between the programme and its effects.

Keeping the question “does it work?” in mind as a departure point, the seven studies of this thesis address different aspects of the questions “why does it work?” and “how does it work?” The aim is to aid in the understanding of factors that influence the operation and effectiveness of community-based injury prevention programmes.

Most studies involved Scandinavian programmes from the WHO Safe Community network. The Safe Community concept was developed in Sweden in the mid-1980s. There are currently (as of 1 January 2006) 74 Safe Communities operating in 18 countries across the world. Designation as a Safe Community is based on local capacity to meet six indicators. One study also involved Canadian programmes from a national network, Canadian Safe Community Foundation. Two of the studies were theoretical, examining the theoretical basis of the community-based approach and delineating the causal mechanisms of these programmes (i.e. “how does it work?”).

The findings from the studies support a number of conclusions with regard to the three research questions posed. There is limited evidence for the effectiveness of community-based injury prevention
programmes. International programmes applying multiple strategies to target multiple injury categories, as evaluated in the scientific literature, have achieved varying degrees of effectiveness, measured as injury rate reductions. The programmes operating in 14 Swedish municipalities designated WHO Safe Communities generally achieved modest degrees of injury rate reductions between 1987 and 2002. In fact, few of them demonstrated more favourable results than municipalities without such designation or Sweden as a whole.

Contextual conditions and the amount of financial resources available to a programme are key factors associated with programme effectiveness. However, there is inconclusive evidence regarding the importance of some of the so-called success factors described in the scientific literature for achieving effectiveness. While many programmes have access to locally collected data, they devote limited time to the analysis of this assembled data. When selecting interventions, many programmes rely upon intuitive and subjective methods, e.g. discussions in networks, feedback from the general public, and experiences gained in their own work. This style of decision making is “experience-based” rather than evidence-based.

The theoretical underpinning of the community-based approach has certain shortcomings, which could explain some of the difficulties in demonstrating effectiveness seen with many of these programmes. Programmes overwhelmingly define geographical units as communities. However, these entities can be highly heterogeneous and characterised by a weak sense of community, which can yield insufficient community member participation and intersectoral collaboration, as well as inadequate reach for many programmes. At the same time, none of the most plausible assumptions of the community-based approach appears to be fully or widely applied in programme practice. The implication is that many community-based programmes do not function at an optimum level.
Papers

The below listed papers are appended and are referred to in the thesis as study A to study G. The papers that have appeared in print are reproduced as published.

- **Study A**: What Makes Community-Based Injury Prevention Work? (Nilsen)

- **Study B**: Effectiveness of Community-Based Injury Prevention (Nilsen, Ekman, Stark-Ekman, Ryen, Lindqvist)
  Submitted to *Accident Analysis and Prevention*, 13 February 2006.

- **Study C**: Towards Improved Understanding of Injury Prevention Programme Sustainability (Nilsen, Timpka, Nordenfelt, Lindqvist)

- **Study D**: Strategies and Goals of Community-Based Injury Prevention Programmes (Nilsen, Hudson, Gabrielsson, Lindqvist)

- **Study E**: Using Local Injury Surveillance for Community-Based Injury Prevention (Nilsen, Bourne, Coggan)
  Accepted by *International Journal of Injury Control and Safety Promotion*, 20 April 2006.
Study F: The Theory of Community-Based Health and Safety Programmes – A Critical Examination (Nilsen)
Accepted by Injury Prevention, 19 February 2006.

Study G: The How and Why of Community-Based Injury Prevention Programmes – A Conceptual and Evaluation Model (Nilsen)

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In addition to these seven papers, the below three papers are referenced in the framework of the thesis.

- Making Sense of Safety – Beyond Injury Prevention (Nilsen, Hudson, Kullberg, Timpka, Ekman, Lindqvist)
  Injury Prevention 2004; Vol. 10: 71-73

- Evaluation of Community-Based Injury Prevention Programmes – Methodological Issues and Challenges (Nilsen)

- Economic Analysis of Injury Prevention – Applying Results and Methodologies from Cost-of-Injury Studies (Nilsen, Hudson, Lindqvist)
1. Introduction

Injuries constitute a major public health problem. Approximately 5 million people die annually as a result of injuries, accounting for 9% of the world’s deaths in 2000 (WHO, 2002). This figure is expected to increase to more than 8 million people in 2020 (Peek-Asa et al., 2004), although many developed countries have experienced a decline in injury deaths since the 1950s (Rivara, 2001). In industrialised countries, injuries have become the third leading cause of overall mortality and the leading cause of death among the 1 to 40 year old age group (WHO, 2004).

While mortality is an important indicator of the magnitude of the injury problem, fatal injuries are only part of the problem. Millions of people are injured each year and survive. For every death due to injury in Sweden, there are approximately 30 hospitalisations and an additional 200 injuries treated at emergency departments (SRV, 2004).

For some, injuries will cause temporary pain and inconvenience. For others, injuries lead to disability, chronic pain, and profound changes in lifestyle. An injury affects not just the person who is hurt, but also many others who are involved in the injured person’s life. With a fatal injury, family, friends, co-workers, employers, and other members of the injured person’s community feel the loss. In addition to experiencing grief, they may experience a loss of income and/or the loss of a primary caregiver. With a nonfatal injury, family members are often called upon to care for the injured person, which can result in stress, time away from work, and lost income. Friends of the injured may be called upon to help out the injured person and his or her family, while the injured person’s employer may struggle with temporary or permanent replacements. Others in the community such as neighbours and volunteer groups may also feel the effects of the injury.
Although the greatest cost of injury is that of human suffering and loss, the financial costs associated with injuries are far from trivial. Almost 50% of the world’s injury-related mortality occurs in young people, aged between 15 and 44 years, which are the most economically productive members of the global population (WHO, 2002). Limited societal resources are required to treat and rehabilitate injured persons. Additional costs are incurred when injuries take place, as absenteeism leads to a loss of productivity. Equally important are so-called intangible costs associated with pain and suffering experienced by injured persons, families, and friends (Angus et al., 1998; Nilsen et al., 2006).

While injuries have been a leading cause of death and disability throughout the history of mankind, they were not scientifically studied until well into the twentieth century. For centuries, injuries were considered synonymous with “accidents,” implying that occurrence of such events was outside an individual’s direct sphere of influence, thus making injuries random, unpredictable and unavoidable occurrences (Reason, 2000a). William Haddon, Jr. observed in 1968 that the injury prevention field “still includes the only substantial, remaining categories of human morbidity and mortality still viewed by most laymen and professionals alike in essentially pre-scientific terms” (Haddon, 1968, page 1431). Due to this prevailing fatalistic attitude, injuries remained a neglected field of research. However, the pioneering work of Haddon and researchers such as De Haven, Stapp, Gordon, and Gibson transformed how injury was conceptualised. Modern injury science began to take shape as a distinct field in the mid-1960s. The key conceptual development was the recognition that patterns of injury distribution and causation can be analysed using the epidemiological tools of public health (Waller, 1989).

For many years, the dominant injury prevention strategy was education, with interventions aimed at teaching people how to avoid injuries on the assumption that people will act in their own interest once informed of risks and benefits (Fincham, 1992). Individual error, negligence, misuse or abuse of equipment, and carelessness were
viewed as the most common causes of injuries (Barry, 1975). Consequently, most research was directed toward uncovering human factors in injury aetiology (Westaby, 1974).

The person-oriented approach to injury prevention was widespread until about the 1970s. However, partly in reaction to the perceived failure of the education approach, injury research and practice gradually gave greater attention to structural (environmental or engineering) solutions and legislation (Bonnie & Guyer, 2002). These solutions had immediate applicability and were largely effective in single-purpose environments such as the workplace and the road environment (Spinks et al., 2004). This shift in perspective generated considerable tension between those who supported structural responses and those who still favoured behavioural perspectives to injury prevention (Christoffel & Gallagher, 1999).

With the growing recognition that neither structural nor behavioural solutions by themselves held the complete answer to the prevention of injuries, the 1980s saw an increasing number of injury prevention programmes that combined behavioural strategies and structural modification of environments and products, thus balancing a personal and collective responsibility for the safety problem (Waller, 1994). Behavioural perspectives were increasingly viewed as complementary rather than antagonistic to structural perspectives. This shift reflected an increased awareness that structural change cannot be accomplished without changing attitudes and behaviours (Waller, 1989). There was also a growing recognition that individuals cannot be considered separately from their social context and that programmes incorporating multiple interventions extending beyond the individual level were most effective (Peterson et al., 2000).

Influenced by large-scale initiatives in the 1970s and 1980s to reduce the high rates of cardiovascular disease found in the US and other industrialised countries, community-based multi-strategy programmes emerged as an important approach to injury prevention in the 1980s (Svanström, 2002). The North Karelia, Stanford Five City, Minnesota
Heart Health, and Pawtucket Heart Health programmes targeted entire communities in order to modify individual health-related behaviours and change the environment in which the behaviours were shaped (Gielen & Collins, 1993; Merzel & D’Afflitti, 2003; Hoffmeister & Mensink, 2004). Community-based injury prevention programmes made it possible to deal with injury problems in less clearly delineated areas than the road and work environment, including home and leisure safety (Jeffs et al., 1993; Spinks et al., 2004).

Applying a wide range of interventions, these multifaceted programmes address multiple injury risk factors and typically involve community members and local organisations in the planning and implementation of interventions (Jeffs et al., 1993). The community-based approach to injury prevention underpins a growing number of movements, including the international World Health Organisation (WHO) Safe Community network (WHO Collaborating Centre on Community Safety Promotion, 2006a), the Worldwide Safe Kids Campaign (Worldwide Safe Kids Campaign, 2006), and national movements such as the Canadian Safe Communities Foundation (SCF, 2006a), Australian Safe Communities Foundation (ASCF, 2006), and Safe Communities Foundation of New Zealand (SCFNZ, 2005).

However, despite wide application of community-based programmes to prevent injuries and promote health over the last 25 years, debate continues to this day about the effectiveness of this approach. For example, Petridou and colleagues (1997, page 174) maintain that the findings have ranged “from encouraging to disappointing” and Langley and Alsop (1996, page 132) suggest that “greater caution should be exercised in promoting these broad, multifaceted intervention programmes.” Kopjar and his colleagues (2000, page 30) have warned that the lack of “clear evidence” as to the programmes’ effectiveness “should raise concerns and questions about the future of community-based injury prevention.”
There is a paucity of evaluations from which to obtain evidence regarding the effectiveness and critical factors contributing to achieving effectiveness of community-based health and safety programmes (Fisher, 1995; Feinleib, 1996; Fishbein, 1996; Merzel & D’Afflitti, 2003; Hoffmeister & Mensink, 2004). Present evidence is inconsistent, as many programmes have demonstrated modest effects in terms of reduced injury risk and/or injury incidence, while others have achieved dramatic injury rate reductions (Gielen & Collins, 1993; Klassen et al., 2000; Turner et al., 2004; Spinks et al., 2004; Nixon et al., 2004; McClure et al., 2005; Spinks et al., 2005a; Spinks et al., 2005b; Turner et al., 2005).

Many of these evaluations have been characterised as “black box” evaluations, with inadequate information about the intervening and contextual factors that mediate the relationship between the programme and its effects (Day et al., 2001; Ytterstad, 2003). The black box is a metaphor used in many sciences to describe phenomena which cannot be directly observed or measured, but whose characteristics must be inferred (Harachi et al., 1999; Pearson et al., 2001). Opening the black box is essential to developing the best evidence in relation to community-based programmes since this requires analysis of process (including the context) as well as effects (Langley & Alsop, 1996; Tones & Green, 2004).

Research on community-based injury prevention programmes thus far has been driven by the question “does it work?” (Dugdill & Springett, 1994; Day et al., 2001). However, merely establishing whether a programme works or not does not provide sufficient information to interpret evaluation results, modify ineffective programmes, replicate effective programmes or generate new knowledge about community-based health and safety programmes (Koepsell et al., 1992; Lipsey, 1993). The overall bias towards the positivist paradigm has been identified as a problem by many health and safety researchers, who have argued that research on community-based programmes needs to move toward a social science model, which acknowledges the importance of finding out why and how a programme works by
combining quantitative and qualitative data (Nutbeam, 1998; Shannon et al., 1999; Harachi et al., 1999; Naidoo & Wills, 2000; Moller, 2004). It has been suggested that community-based injury prevention research now has reached a point where additional outcome-focused programme evaluations are likely to provide diminishing returns in terms of advancing the understanding of this approach to injury prevention (Day et al., 2001).

Keeping the question “does it work?” in mind as a departure point, this thesis addresses different aspects of the questions “why does it work?” (or, equally important, “why does it fail?”) and “how does it work?” The aim is to aid in the understanding of factors that influence the operation and effectiveness of community-based injury prevention programmes.
2. Definitions

There are a number of concepts and terms essential to this thesis, which need to be clarified and defined for improved understanding of the framework and individual papers.

2.1. Injury

Injury is commonly defined as damage to the body caused by the transfer of one of the five forms of energy (mechanical, chemical, thermal, electrical, and radiation) in amounts or at rates that exceed the threshold of human tolerance. Injury may also result from lack of essential energy such as oxygen (e.g. drowning) or heat (e.g. hypothermia) (Berger & Mohan, 1996; Christoffel & Gallagher, 1999; Pless & Hagel, 2005).

The line between injury and disease is often vague. Injury is usually defined as occurring during a short period of time, as opposed to the effects of repeated exposure to chemical agents or cumulative damage from repetitive motion; it is the acuteness of exposure that differentiates injury from disease (Robertson, 1983; Christoffel & Gallagher, 1999). Thus, a crushing weight falling on a person is generally classified as an injury, while years of lifting heavy weights might result in a disease. Similarly, a brief exposure to toxic gas is often considered an injury whereas the result of long-term, less concentrated exposures is usually classified as disease.

Unlike most diseases, injuries are defined simultaneously by the causative event and by the resulting pathology. For instance, bruising can occur in absence of mechanical insult to the body and cannot be considered an injury. Likewise, car crashes that result in no pathology
are not injuries (Langley & Brenner, 2004). Hence, the theoretical definition of injury must incorporate both cause and outcome, as shown in figure 1.

Figure 1: Theoretical definition of an injury

There exists no exact cut-off point for what severity should be counted as an injury. The most common approach for assessing injury severity is to define three levels: injuries leading to death; injuries resulting in hospitalisation; and injuries that are treated in outpatient clinics or other health care settings, including emergency departments (non-hospitalisations). In practice, there are also injuries that fail to reach the health sector, e.g. injuries treated outside the formal health service system and minor injuries that do not necessarily require medical attention. Severity scales based upon the nature of the injury have been developed to rate the degree of injury damage in hospitalised patients and fatalities, making it possible to group and compare different injuries (Barss et al., 1998).
The most widely used system for classification of injuries is the 10th version of the WHO’s *International Statistical Classification of Diseases and Related Health Problems*. Injuries within the ICD-10 are divided into two main categories: unintentional and intentional injuries. The latter are injuries that are purposely inflicted, either by the victims themselves (e.g. suicide) or by other persons (e.g. homicide) (WHO, 2004). The line between “intentional” and “unintentional” injuries is not always apparent (Bonnie & Guyer, 2002). In addition to intent, injuries can be classified by many other categories, including the mechanism which caused the injury (road traffic injuries, poisoning, falls, fires, and drowning), nature of injury (e.g. fracture, concussion, laceration), body parts injured (e.g. skull, chest), and place of occurrence (e.g. home, school, workplace) (Berger & Mohan, 1996; WHO, 2002; WHO, 2004).

The term “accident” was previously used to denote an unintentional injury, but injury researchers and practitioners have long discouraged the use of this term when it refers to injuries or the events that produce them. They believe it reinforces public misconception that injuries are unpredictable and unpreventable random events (Barss *et al.*, 1998). Despite criticisms of the misleading implications of the term “accident,” the tradition hangs on and accident is still often used to mean an event that produces, or has the potential to produce, an injury (Berger & Mohan, 1996). This appears to be more of a case in Europe than in America (Bonnie & Guyer, 2002). I have refrained from using the word “accident” in this thesis.

### 2.2. Prevention

Prevention has been defined as “the promotion and preservation of health, the restoration of health when it is impaired, and the minimisation of suffering and distress” (Haddix *et al.*, 1996, page 149). Traditionally, three levels of prevention are distinguished based
on when the “natural course” of disease is intervened. Primary prevention refers to strategies and measures to reduce the risk of ill-health. Secondary prevention attempts to prevent progression of ill-health. Tertiary prevention seeks to limit the disability or consequences of ill-health (Menckel, 1998; Naidoo & Wills, 2001).

Primary injury prevention applies to the prevention of the injury event (i.e. the “accident”) through the elimination or modification of risk. Secondary prevention involves mitigation of the consequences of injury events. Tertiary prevention, meanwhile, is treatment and rehabilitation to prevent mortality and morbidity due to injury (Pless & Hagel, 2005). The meaning of secondary prevention of injuries has been the focus of some debate as the temporal scope for secondary prevention is virtually non-existent due to the rapidity with which injuries occur (in contrast to most diseases). For example, whereas Pless and Hagel (2005, page 183) state that “most prevention is at the secondary level,” Menckel (1998, page 207) argues that most injury prevention can be characterised as primary prevention, which she believes is “virtually synonymous with prevention itself.”

An important conceptual distinction is made between “injury prevention,” which involves primary and secondary prevention, and “injury control,” which encompasses not only injury prevention, but also tertiary prevention (Barrs et al., 1998). Hence, “injury control” is a more precise term than “injury prevention” when severity of injury can be reduced without reducing incidence (Robertson, 1998).

### 2.3. Safety

Definitions of safety tend to say more about what comprises “unsafety” than about the substantive properties of safety itself. For instance, the *Merriam-Webster Dictionary* defines safety as “the condition of being safe from undergoing or causing hurt, injury, or
Injury prevention researchers define safety as a state of being adequately protected against injury (Pearn et al., 2004) and/or an ability to deal with risks (Reason, 2000b). Safety is seen as a prerequisite for the health and welfare of a population (WHO, 1998). There is general agreement that safety, in a strict sense, can never be fully attained. Individuals can never be wholly safe, because “gravity, terrain, weather, fire, and the potential for uncontrolled releases of mass, energy, and noxious substances are ever-present dangers” (Reason, 2000b, page 5).

Due to this multitude of views on the concept of safety, a collaborative effort was launched in 1996 to develop international consensus on the concept. The project was spearheaded by two WHO Safe Community Collaborating Centres on Safety Promotion and Injury Prevention, sponsored by the Ministry of Health, Quebec, Canada, and Karolinska Institute, Stockholm, Sweden (Andersson, 1999). A document was published in 1998 entitled Safety and Safety Promotion: Conceptual and Operational Aspects. The researchers behind the WHO document arrived at a definition of safety as a “state in which hazards and conditions leading to physical, psychological or material harm are controlled in order to preserve the health and well-being of individuals and the community” (WHO, 1998, page 1).

WHO’s document on the safety concept distinguished two dimensions of safety: an objective dimension, which is often understood as “non-injury,” i.e. the absence or reduction of injury occurrence (Andersson, 1999), and a subjective dimension, which can be understood as the individual’s feelings or perceptions of being safe (Maurice et al., 1997; WHO, 1998). Hence, objective safety is based on externally defined objective grounds, while subjective safety is related to internally defined subjective aspects (Suddle & Waarts, 2003).

Subjective safety has been conceptualised as having cognitive, affective, and conative components. The cognitive component is the individual’s knowledge of or beliefs concerning the risks involved in a particular situation or environment (i.e. the attitude object) and his or her
imagination of potential consequences. The affective component is the individual’s emotional response to the situation or environment, e.g. a feeling of anxiety. The conative component is a disposition to act in a certain way toward the situation or environment. The affective, cognitive, and conative assessments may yield a behavioural change (Liang et al., 1983; Zani et al., 2001).

While subjective safety is clearly associated with objective safety, the two dimensions do not always correspond. In fact, a sometimes paradoxical relationship exists, as people may feel needlessly frightened in relatively safe situations or inappropriately safe in dangerous situations (Purtscher, 2002; Nilsen et al., 2004). Thus, a diminished subjective safety may actually improve objective safety. For example, when Sweden changed over to right-hand traffic in 1967, the move resulted in 17% less road deaths in the first year (increased objective safety) as people drove more cautiously (decreased subjective safety) ( Alexandersson, 1972). Conversely, enhancement of subjective safety can lead to a deterioration of objective safety, e.g. acquiring a firearm for protection (increased subjective safety) may heighten the risk of a household injury (decreased objective safety) (Maurice et al., 1997).

Safety is often assumed to represent the goal or the successful outcome of injury prevention programmes (Pless & Hagel, 2005). Despite WHO’s holistic safety concept, injury prevention programmes are predominantly concerned with the objective dimension of safety, where success is largely viewed as obtaining “non-injury” status (or reduction in the incidence and/or severity of injury) (Svanström, 2002; Klassen et al., 2000; Nilsen et al., 2004).

### 2.4. Risk

Risk has traditionally been defined as the “inverse” of safety (Wilde, 1998; Melinder, 2000). Thus, the greater the risk, the lesser the safety, and vice versa. As risk cannot ever be entirely eliminated, it follows
that we can never be wholly safe. Injury risk has been defined as “the likelihood of damage or injury” (Harms-Ringdahl, 1993, page 2) and “the probability that the injury, or a specific level of severity, will occur in use of a given product or participation in a given activity” (Robertson, 1998, page 42). Injury risk is an estimate of what will happen in the future and is usually derivable from injury frequency based on the assumption that the previous frequency will continue, and adjusted for deaths that eliminate future participation (Kelsey et al., 1986). While risk is often defined as the possibility of occurrence of an undesirable event, the consequences or magnitude of the consequences also form an important dimension of risk (Rundmo, 1996). Hence, risk can be described as a function of a probability of an adverse event and the harmful consequences of that event (Royal Society, 1983).

As with objective and subjective safety, risk can both relate to an objective reality and to a subjective interpretation (Michalsen, 2003). Subjective risk is the way people interpret risk, i.e. the perceived probability of an undesirable event and its consequences (Rundmo, 1992). Objective risk is based on objective and quantifiable data (Chauvin & Hermand, 2006). Defining safety as the inverse of risk implies that it is a simplification to interpret objective safety merely as “non-injury” (absence or reduction of injury occurrence). Rather, objective safety should be understood as the presence of protection (or absence of hazards) that reduces the probability of an adverse event, including an injury, and/or reduces the probability of harmful consequences of that event.

Since objective risk is an estimate based on assumptions about the future, it can be argued that objective risk does not equal the inverse of objective safety. Instead, objective risk could more appropriately be defined as the inverse of past objective safety, i.e. an objective measure of safety up until the present. The relationship between objective risk, subjective risk/safety, and objective safety, therefore, could be conceptualised as a sequence or cycle, as illustrated in figure 2. Objective risk affects subjective risk/safety, as people make assessments of the risk involved in a particular situation or environment, potentially
yielding behavioural modification that results in altered objective safety, which in turn modifies objective risk. For example, objective risk reduction due to safety-enhancing features like anti-lock brake systems or increased lane-width can be offset by risk compensation, as individuals feel safer and adapt their behaviour to their higher level of perceived safety (i.e. lower level of perceived risk), thereby driving faster, which may reduce objective safety rather than increasing it (Sagberg et al., 1997).

Figure 2: The relationship between objective risk, subjective risk/safety, and objective safety
The so-called risk homeostasis theory purports that injury rates per capita remain relatively constant regardless of the introduction of new safety measures because people attempt to compensate, over the long term, to restore the prior level of subjectively desired risk (Trimpop, 1996; Hayes et al., 1996). While it is generally accepted that people tend to adapt their behaviour in response to their level of perceived risk/safety, the risk homeostasis theory’s assumption about a universal risk compensation behaviour is controversial and has been criticised as implausible (O’Neill & Williams, 1992).

People’s perception of risk often deviates from the actual (objective) risk (Rundmo, 1996). Figure 3 characterises an individual’s concern or lack thereof as adequate or inadequate depending on the combination of the levels of objective risk and subjective risk/safety. “Inadequate concern” might be exemplified by fear of travelling by airplane, while travelling by car could exemplify “inadequate unconcern,” as people tend to feel more at risk (i.e. less safe) when flying compared to driving a car despite the fact the risk is much higher for an injury from cars than for airplanes (Johansson-Stenman, 2006).

“Inadequate concern” and/or “inadequate unconcern” may lead to a response that is disproportionate to the actual possibility of injury occurrence, resulting in decreased objective safety. A number of factors influence safety/risk perception, including perceived controllability of undesired consequences, knowledge of the particular event involved, and voluntariness of exposure (Vlek, 1996). People tend to overestimate recently manifested risks and risks leading to more fatalities per manifestation (Michalsen, 2003). Experts are believed to adhere more strictly to scientific assessments of risk, while laypersons pay more attention to the consequences (Lindén et al., 1989). This dissonance creates a potential conflict between the perspectives of individuals and the society (Royal Society, 1992).
2.5. Injury prevention versus safety promotion

The term “safety promotion” is sometimes used instead of “injury prevention,” typically implying a broad approach to injury prevention that addresses multiple determinants of safety and not merely individual risk factors (Svanström, 2000). The WHO’s 1998 document Safety and Safety Promotion: Conceptual and Operational Aspects defined safety promotion as “the process applied at a local, national,
and international level by individuals, communities, governments, and others, including enterprises and non-governmental organizations, to develop and sustain safety.” According to this definition, this process includes “all efforts agreed upon to modify structures, environment (physical, social, technological, political, economical, and organisational), as well as attitudes and behaviours related to safety” (WHO, 1998, page 1).

WHO’s definition of safety promotion could be seen as an analogous concept to community-based injury prevention (which is characterised in more detail later in chapter 3). Despite this, the term “community-based safety promotion” is frequently applied, instead indicating that safety promotion may simply be regarded as synonymous with injury prevention or that the two concepts might be part of a continuum of interventions. For instance, Andersson (1999, page 34) interprets injury prevention as “the implementation of specific measures like seat belts, bicycle helmets, and so on, or the actual shift in people’s behaviour as regards drinking and driving, for example.” He views safety promotion as “the preceding campaigns and activities which are normally necessary to achieve such changes.” However, Andersson (1999, page 34-35) readily admits that “there is no sharp distinction between injury prevention and safety promotion” and that they “serve the same purpose, to prevent injuries.”

Throughout this thesis, I have used the term “injury prevention” instead of “safety promotion,” for several reasons. Safety promotion has been proposed by some researchers (e.g. Andersson, 1999; Welander et al., 2002) to be a “sister concept” to health promotion. However, many health promotion programmes actively target subjective health aspects and measure self-rated health as an outcome (Downie et al., 2005), whereas programmes aimed at enhancing safety (regardless of whether referred to as safety promotion or injury prevention programmes) predominantly aim at reducing injury rates, i.e. improving objective safety (Svanström, 2000; Pless & Hagel, 2005). As long as programmes focus on the objective dimension of safety, i.e.
preventing injuries, “injury prevention” more accurately describes the field than “safety promotion.”

Some researchers have viewed the dichotomies of health-disease and safety-injury as analogous, inferring that injury prevention, like disease prevention, is concerned with the medical model’s individual focus. This is in contrast to health promotion, which focuses more attention towards determinants of health (Welander et al., 2002). For example, Svanström (2000, page 181) states that “the starting point of injury prevention is an outcome of a process where the medical view decides the prevention activities in the same way as in disease and disease prevention.” However, this explanation overlooks the fact that safety is as much concerned with structural modification of environments and products as with solutions targeting the individual. Indeed, injury prevention programmes have long implemented strategies and measures intended to benefit populations rather than specific individuals (Christoffel & Gallagher, 1999).

Another reason for using the term “injury prevention” is that this term is still far more widely applied and accepted than “safety promotion.” Internet searches using different search engines (Google, Yahoo!, and AltaVista) show that “injury prevention” is 20-25 times more common than “safety promotion” and “community-based injury prevention” is 10-15 times more frequently used than “community-based safety promotion.”

### 2.6. Activities to achieve safety goals

The literature on injury prevention employs a broad array of terms for activities undertaken to achieve safety goals. Injury prevention “strategies” have been classified in numerous ways, e.g. into the “3 E’s” of education, engineering, and enforcement (Robertson, 1998), the four categories of education, product modification, environmental
modification, and enforcement (Berger & Mohan, 1996), or as active strategies (also known as “behavioural strategies”) and passive strategies (“non-behavioural strategies”) depending on the extent to which a measure protects an individual regardless of human activation (Williams, 1982).

Individual strategies are comprised of any number of “measures” or “counter-measures,” e.g. placing sand beneath children’s play equipment or the use of hip protectors (McClure et al., 2005). If both strategies and measures are involved or described, I have sometimes used the more general terms “activities,” “action,” “approach” or “intervention.”

2.7. Injury prevention programmes

Community-based programmes are often referred to as being “multifaceted” (e.g. Bonnie, 1999) to denote the multi-strategy, multi-level, multi-setting nature of this type of programme. The characteristics of the community-based approach are explained in more detail later in chapter 3. Additionally, I have used “safety programme” and “health programme” as generic terms for community-based programmes aimed at enhancing safety (i.e. essentially injury prevention programmes, according to the preceding discussion) and health (health promotion and/or disease prevention programmes), respectively. When referring to specific aspects of a programme, e.g. its strategies, activities, staff, budget or duration, I have used the term “programme component” (or, “programme components”).

Health programmes are often analysed in terms of the so-called Donabedian’s triad, which distinguishes between three elements: “structure,” “process” (or “processes”), and “effects” (Donabedian, 1980). The programme’s structure is often referred to simply as the resources of the programme, but may also encompass aspects such as administrative and/or organisational components (Menckel, 1999).
Process refers to the content of a programme, with the term “activities” sometimes being used instead of process (Weiss, 1998). I have used the term “resources” in this thesis with the exception of study A, which applied the term “structure” because this was more commonly used in the evaluations under study. Likewise, I have used the term “process” throughout the thesis but refer to “activities” in study C because this term was deemed more descriptive and precise than “processes” for the purpose of the study.

Localities that have been designated WHO Safe Communities as they operate community-based injury prevention programmes that fulfil certain designation criteria (described in chapter 5) are typically referred to as “WHO Safe Communities,” while the programmes are often called “WHO Safe Community programmes” (e.g. Lindqvist et al., 2001; Coggan & Bennett, 2004). This is how I have referred to these localities and programmes. However, in actuality, WHO endorses the authorising body, i.e. the WHO Collaborating Centre on Community Safety Promotion, not the actual localities or programmes per se. This means that it is more appropriate to refer to the localities as Safe Communities and the programmes operating in these communities as Safe Community programmes.

### 2.8. Consequences of injury prevention activities

The literature on injury prevention and health promotion uses three interchangeable terms for the consequences of health and safety activities: “outcome,” “results,” and “effects” (Weiss, 1998; Övretveit, 2000). I have used the terms interchangeably in the papers.

“Effectiveness” is the improvement in outcome (effects, results) that the programme (activities, strategies, measures, etc.) can produce in real-world settings. “Efficacy” is the improvement in outcome under ideal circumstances (Haddix et al., 1996).
3. Framework

This chapter provides a theoretical framework that serves as the basis for the studies included in this thesis. The chapter begins with a summary of historical influences on community-based injury prevention programmes. A description of the theoretical underpinning of the contemporary approach to community-based health and safety programmes is provided (expanding upon the description in study F, “The Theory of Community-Based Health and Safety Programmes – A Critical Examination”). The causal mechanisms of these programmes are delineated (using material found in study G, “The How and Why of Community-Based Injury Prevention Programmes”). This is followed by an overview of key methodological challenges to evaluating community-based injury prevention programmes. The chapter ends with a brief review of the current evidence base regarding the effectiveness of community-based injury prevention programme.

3.1. Community-based health and safety programmes in a historical perspective

Contemporary community-based health and safety programmes are based on a number of influences. The most obvious historical influences are community organisation and community development, two traditions in the larger area of social work (Stoecker, 2001). Community organisation has also variously been termed community planning, community relations, community work, planned change, social action, social reform, and political action, while community development is also known as locality development (Rothman, 1980; Twelvetrees, 1982; Midgley, 1986; Tones & Green, 2004).
While there are many similarities between the community organisation and community development models (and the two terms are occasionally used interchangeably (Tones & Green, 2004)), the concepts are, in fact, quite different. Community organisation incorporates elements of conflict theory (Stoecker, 2001), according to which society develops through struggle between groups (Jary & Jary, 2000). In contrast, community development stresses consensus, being rooted in functionalist theory (Stoecker, 2001), which assumes that society tends toward natural equilibrium and its division of labour develops through an almost natural matching of individual talents and societal needs (Jary & Jary, 2000).

### 3.1.1. Community organisation

The term “community organisation” was coined by American social workers in the late 1800s to describe their efforts to coordinate services for newly arrived immigrants and the poor. Social workers set up settlement houses in Midwestern and East Coast cities of the US, providing services such as childcare and English language classes (Minkler & Wallerstein, 1997). Some settlement organisations also advocated for workers, urging government to take action to improve housing and create child labour laws. Another early influence was the populist movement, a politically oriented coalition of agrarian reformers in the Midwest and South that advocated a wide range of economic and political legislation in the late 1880s (Ross, 1967).

While early approaches to community organisation predominantly emphasised cooperation, the labour movement of the 1930s and 1940s taught the use of conflict as a means of bringing about change (Minkler & Wallerstein, 1997). By the 1950s, a more confrontational brand of community organisation was gaining popularity. Inspired by the ideas and activities of Saul Alinsky, community organisation increasingly began stressing conflict strategies for social change. Alinsky mobilised local people through existing grassroots organisations, teaching them
to use a variety of confrontational tactics when dealing with government organisations and commercial interests (Horwitt, 1989).

From the 1960s onward, strategies and tactics of community organisation increasingly were applied to the achievement of broader social change objectives in the US and elsewhere. The US civil rights movement was coordinated through local African-American networks and organisations, creating a model that would be used in locality-based actions throughout the South. Out of these efforts grew the welfare rights movement and a variety of protest movements (Stoecker, 2001). Movements formed by minorities, student activists, and protesters against the war in Vietnam generated strong interest in grassroots organising and planning with local citizens (Rothman, 1980).

This more radical style of community organisation also took root in Europe. Instead of seeking to help deprived communities to improve their social and environmental circumstances, the new community work activists in Europe urged that people take direct political action to demand changes and improvements (Midgley, 1986).

Since the mid-1970s, community organisers have prioritised the development of multi-issue organisational vehicles. Community organisers have demonstrated increased sophistication in attracting allies, developing community cohesion, and marshalling power, not only locally, but on regional and national levels (Neighborhood Funders Group, 2001).

3.1.2. Community development

Community development can be traced to colonial development in the Third World (Watt, 1986). The term was first defined in a 1948 report to describe the strategies of the British colonial powers in East Africa during the 1940s, which aimed “to mobilise the labour of rural and urban communities in support of national government objectives to
build social and physical infrastructures, and increase self-reliance” (Pratt & Boyden, 1985, page 141).

Community development was popularised in the United Nations (UN) in the 1950s and 1960s in the wake of decolonisation. UN saw community development as a means of rapidly introducing modernisation in the rural areas of the non-Western world. Community development was seen as directly addressing the problems of social injustice, hunger, and poverty (Rifkin, 1985).

By the 1960s, however, experience in community development programmes highlighted the idealistic nature of the approach and exposed the fallacies of some of the assumptions on which community development was based. Disillusionment with the achievements of community development was widespread by the 1970s (Midgley, 1986). Community development increasingly lost its attractiveness to many underdeveloped countries (Swedner, 1982).

3.1.3. Towards contemporary community-based health and safety programmes

Although community organisation and community development provided a source of inspiration for the community-based approach, the emergence of community-based health and safety programmes can also be seen as a consequence of the UN’s programme for popular participation, which was concerned with broad issues of social development and the creation of opportunities for the involvement of people in the political, economic, and social life of a nation. This programme was formalised in the 1970s with the publication of two documents, which were followed by the creation of a major research programme into popular participation by the UN’s Research Institute for Social Development. The popular participation idea soon inspired more specific conceptions of community-level involvement in social development (Midgley, 1986).
The adoption of the WHO Declaration of Alma Ata in 1978 is a crucial milestone in the history of the community-based approach to health and safety programmes (Naidoo & Wills, 2000). This document recognised the need for action by sectors other than the health sector and the importance of actively involving people in the process of promoting and protecting their health (WHO, 1978). This declaration was extremely influential, informing much subsequent thinking and making the concept of community participation a major focus of activities in the health field (Tones & Green, 2004).

3.2. Assumptions of the community-based approach

While contemporary community-based health and safety programmes do not conform rigidly to a set of predefined criteria, most community-based programmes are based on a number of explicit or implicit assumptions. The seven principles presented here represent key assumptions of the community-based approach to health and safety programmes. Although described as seven distinct principles, there is considerable overlap between the individual principles.

3.2.1. Community focus

The community-based approach recognises the community as a unit of identity and the appropriate focal point for health and safety programmes. The community is both the target and the catalyst for change (Israel et al., 1998; McLeroy et al., 2003). This community focus is due to the realisation that humans live in, are shaped by, and in turn shape the environment in which they live (McGee, 1998). Therefore, individuals cannot be considered separately from their environment (Goodman et al., 1996; Merzel & D’Afflitti, 2003).
People’s health and safety-related knowledge, attitudes, behaviours, and skills reflect their life experiences and these experiences are determined by broader institutional structures, cultural forces, and social relations within the community (McGee, 1998). This means that explanatory models centred on intra-personal determinants are of limited value to understand individuals’ health and safety; such an understanding can be achieved only if the context in which people live is taken into account (Richard et al., 1996; Sallis & Owen, 1997; Israel et al., 1998).

The community is the level where many of the processes that affect people’s health and safety transpire (Hoffmeister & Mensink, 2004). Members of a community are assumed to have a sense of community, which means that they have a sense of belonging to and of sharing common aspirations with the other members of the community (Steuart, 1993; Goodman et al., 1998; Israel et al., 1998). It has been suggested that most people yearn to be part of a larger network of relationships that give expression to their needs for intimacy, usefulness, and belonging (Sarason, 1974).

A community can be understood both in terms of a geographical location (town, city, municipality, etc.) and a relational entity, which refers to qualities of human interaction and social ties that draw people together (Heller, 1989). The two usages of the term are not mutually exclusive and the sense of community concept applies equally to the geographical and relational notion of community (McMillan & Chavis, 1986).

### 3.2.2. Community member participation

A key element of the community-based approach is the principle of participation, i.e. the involvement of community members in defining the health/safety problem and finding the solutions. Community member participation refers to “the social process of taking part (voluntarily) in either formal or informal activities, programmes,
and/or discussions to bring about a planned change or improvement in community life, services and/or resources” (Bracht & Tsouros, 1990, page 201). The 1989 Manifesto for Safe Communities, generated at the First World Conference on Accident and Injury prevention, echoed the 1978 Declaration of Alma Ata when it stated that “people have a right, and some would say a duty, to participate individually and collectively in the planning and implementation of their community’s safety work” (WHO, 1989, page 4-5).

Participation by community members benefits not only the community as a whole, but also the individuals who take action within the community. Participation is assumed to lead to individual empowerment, as people gain skills in assessing needs, setting priorities, and gain control over their environment (Kreuter et al., 2000). The experience of involvement enhances the integrity, skills, knowledge, and experience, as well as the equality of power, for each individual who participates (Smart, 1999). Thus, the processes associated with participation are regarded as positive activities in their own right.

A number of reasons to promote community member involvement in community-based programmes have been proposed. The principle of relevance states that change will be greatest when programmes “start where the people are” (Durham, 1963, page 143) and engage community members for their knowledge of what matters to the community population (Weiss, 1998; Gielen & Sleet, 2003). This participation engenders a sense of identification and continuing responsibility for the programme, often referred to as the principle of ownership (Carlaw et al., 1984; Thompson & Kinne, 1990). Certainly, if the community actively opposes a programme, it is unlikely that the programme will have any effect and may actually produce social disruption and harm (Treno & Holder, 1997). Programme support by local opinion leaders enhances confidence in the benefits of the programme and makes it easier for individuals to accept the programme (Hoffmeister & Mensink, 2004).
Involvement by community members is a way to incorporate local values, attitudes, and symbols into the programme components and to build the layman’s perspective into the programme. Community member involvement can also facilitate pre-tests of the feasibility and acceptability of new interventions, as well as providing access to local leaders, resources, and technical skills not otherwise available (Bracht & Tsouros, 1990).

Community member participation represents a bottom-up (or grassroots) approach to programme planning and decision-making. In contrast, a top-down approach involves outside agents and/or experts defining the issue, developing strategies to resolve the issue, and involving the community to assist in implementing the programme (Laverack, 2004). While a top-down approach has been effective in some areas of injury prevention, including road and workplace safety, this approach has been questioned on the grounds that it results in limited community ownership of the injury problem and solutions, which means that community members are not encouraged to think and act for themselves as they do not perceive that safety is their responsibility (Berger & Mohan, 1996). A bottom-up approach is essential in dealing with less defined injury problems, in environments where regulation and enforcement is difficult to achieve (Moller, 1992). However, the dichotomy between top-down and bottom-up approaches is not as fixed as it is sometimes portrayed, as many community-based health and safety programmes tend to combine aspects of bottom-up and top-down approaches (Laverack, 2004).

3.2.3. Intersectoral collaboration

Collaboration among different community sectors and organisations for a common purpose is a central element of the community-based approach (Nutbeam, 1994; Merzel & D’Afflitti, 2003). Intersectoral collaborative efforts, often referred to as community coalitions, are composed of “individuals representing diverse organisations, factions,
or constituencies within the community who agree to work together to achieve a common goal” (Butterfoss et al., 1996, page 66).

An important rationale for intersectoral collaboration is that a great deal of that which has a direct impact on health and safety is outside the realm of the health sector (O’Neill et al., 1997). Representation from multiple community sectors, organisations, groups, and key individuals is valued because of the collaborators’ local knowledge and capacity to translate the health and safety messages into the local culture (Hawe, 1994). The community coalition can increase the credibility for the programme, as representation from different sectors enables an understanding of and a response to “true” community needs (Granner & Sharpe, 2004). Intersectoral collaboration is a way to insure local ownership and long-term maintenance of the programme (Bracht & Tsouros, 1990). It is assumed that community coalitions can achieve a vision that would not otherwise be possible to obtain as separate actors working independently (Gajda, 2004).

Injury prevention traditionally has been developed within sectors of responsibility, such as road safety and workplace safety, with separate consideration of injuries to children and the elderly, typically with very little cross-reference between sectors (Jeffs et al., 1993). By working together, individual entities can better coordinate services across sectors and thus provide more efficient use of local resources and reduce redundancy in community services (Parker et al., 1998; Gajda, 2004).

3.2.4. Substantial resource requirements

The challenges involved in establishing and maintaining effective community-based health and safety programmes are considerable and require a substantial resource investment (Mittelmark et al., 1993; Cheadle et al., 1997; Turner et al., 2004). The importance of identifying and building on existing community resources is recognised. Financial resources may include funding from community agencies and
foundations, technical equipment, and meeting space and facilities for programmatic activities (Goodman et al., 1998). Financial resources can also be “expressed” as personnel resources and/or time devoted to the injury prevention work (Bjärås et al., 1991; O’Loughlin et al., 1998; Ader et al., 2001).

In addition to traditional financial resources, community-based health and safety programmes also utilise intangible ones (O’Connor, 1995). Community-based health and safety programmes require large investments of human resources in the form of leadership skills and knowledge-sharing by programme collaborators (Bjärås, 1991; Backe, 2003). Community involvement is increased when strong collaboration exists among the different stakeholders; these relationships constitute important relational resources (or social capital) for most community-based programmes (Rifkin, 1986; Bracht & Kingsbury, 1990; Flynn, 1995; Rosén & Jansson, 2000; Petersen, 2002).

Although the community’s internal resources can be seen as the raw materials for programme operation, community-based health and safety programmes may also require resources and skills available from outside of the community (Israel et al., 1998). External institutions can provide technical assistance, facilitate relationships with political and funding institutions, legitimise existing activities, and provide financial support or leverage to raise additional funds (Cheadle et al., 1997).

### 3.2.5. Long-term programme view

The community-based approach recognises the importance of taking a long-term view of health/safety problems and their solution. Developing collaborative relationships with local organisations is a slow, gradual process, often requiring years for programme management to establish an environment of trust, involvement, and true understanding of local health and safety concerns (Gajda, 2004; Turner et al., 2004).
Communities are more likely to commit themselves to programme development when it is not seen as a temporary project or experiment. Programmes that have a high visibility for a short period but fail to be maintained after the initial thrust create a sense of resentment for communities (Shediac-Rizkallah & Bone, 1998). Discontinued programmes could therefore pose obstacles to subsequent community mobilisation. New programmes may encounter diminished community support in communities with a history of programmes that were abruptly or inappropriately terminated (Pluye et al., 2004).

Achieving community-wide health and/or safety effects is a lengthy process because large segments of the population must be exposed to the programme (O’Loughlin et al., 1998). There is often a latency period between the beginning of a programme and its effects on population health and safety. Since the effects manifest themselves over a longer time frame, long-term programme viability is a prerequisite for meaningfully assessing effects (Rissel et al., 1995; Ader et al., 2001).

3.2.6. Multifaceted interventions

The community-based approach uses multiple interventions addressed at multiple risk factors in multiple settings and at multiple community levels (Schwartz et al., 1993; Stokols, 1996). Settings are the locations in which the interventions are implemented, e.g. schools, workplaces, homes, neighbourhoods, churches, and clinical settings (Richard et al., 1996), while levels may range from individuals, families, small groups, and organisations to the community at large (Kubisch et al., 1995).

Multifaceted interventions may be planned and implemented within the framework of numerous individual, organisational, and community-level change models and theories, including Bandura’s social learning theory, social marketing theory, Rogers’ innovation-diffusion theory, community stages of readiness, and various health behaviour models and theories (Puska et al., 1985; Thompson & Kinne, 1990; Fincham, 1992; Goodman et al., 1996; Sleet & Gielen, 2004).
This multifaceted strategy is intended to maximise the effect of the programme throughout the community by taking advantage of a synergy that is assumed to exist among different programme components (Mittelmark et al., 1993; Goodman et al., 1996). Earlier injury prevention approaches addressed specific types of injuries in isolation of each other and paid little attention to whether there were common risk factors between different types of injury (Moller, 1992).

With its emphasis on dynamic interplay between different community levels and settings, the community-based approach represents an ecological perspective (Stokols, 1992). Various community levels and settings are seen as a complex, nested, and interactive system. The ecological perspective incorporates a variety of concepts derived from systems theory (e.g. interdependence and homeostasis) to understand the interrelations between people and their environments (Stokols, 1996).

3.2.7. Population outcome

The multifaceted interventions of community-based health and safety programs are aimed at achieving community-wide health and safety effects; a population outcome is the goal (Gielen & Collins, 1993; McGee, 1998). Hence, the approach directs many interventions towards the general population in the community rather than to high-risk individuals (Hoffmeister & Mensink, 2004). The population-based strategy is an attempt to control the determinants of morbidity and mortality and to lessen risk across the population (Blackburn, 1983).

It has been postulated that a population-based strategy is beneficial whenever risk is widely diffused through the whole population (Rose, 1992). However, regardless of how much benefit the population-based strategy may offer to the community as a whole, the strategy may be of little use to a given individual, with a resultant “prevention paradox” (Rose, 1981). Still, even smaller effects can be meaningful at the
community level, where a modest reduction in the level of risk within a population can have a significant public health impact.

3.3. The causal mechanisms of a multifaceted injury prevention programme

The model depicted in figure 4 specifies the presumed causal chain of a multifaceted injury prevention programme, illustrating the causal assumptions (the arrows) linking subcomponents (the boxes) of six elements, from programme resources via delivery of and exposure to programme components to attitudinal effects, injury risk effects, and safety effects. In addition, the context may influence any or all steps of the pathway (although arrows from the context to the different elements are not shown per se). The context is the wider social, cultural, physical, political, legal, and economic environment within which the programme functions (Platt et al., 2004).

The on-going nature of the programme is indicated by the arrow (directed from right to left) connecting objective and subjective safety with resources, which creates a programme feedback loop, as continuous adjustments are made in response to the effects. It is important to emphasise that the model does not constitute a goal hierarchy, which implicitly means that improvements in any of the subcomponents could feasibly be a desired programme goal.
Figure 4: The causal paths of a multifaceted injury prevention programme

This conceptual model was developed by elaborating on the resource-process-effects triad of the “Donabedian’s triad” (Donabedian, 1980). The model adds the context as an integral element, specifies three types of effects, distinguishes between two dimensions of the process (dose delivered and received) as well as between two safety dimensions (objective and subjective safety). Still, the model does not account for every possible aspect of community-based injury prevention programmes. After all, models are only representations of reality, delineating those aspects considered most relevant to the problem investigated (Bowling, 2002).

The conceptual model can be used to determine whether the required circumstances were in place for the desired effects. If they were, and if the theoretical assumptions of the community-based approach to
health and safety programmes are correct, then there is a good probability of injury prevention success.

### 3.3.1. Resources

The recognition of a community health or safety problem and a decision to address the problem provide a base for mounting and running a community-based programme (Bracht, 1990). Programmes to enhance health and safety constitute “an organised response to a perceived problem” (Clarke & Dawson, 1999, page 21). Obviously an injury prevention programme requires sufficient resources to deliver interventions necessary to solve the community safety problem.

Most injury prevention programmes have a budget that specifies the amount of money that the organisation can spend on the programme. However, resources are not merely financial outlays, but also include, for instance, the value of volunteers’ time and the use of facilities (Gorsky et al., 1996). Furthermore, the importance of intangible organisation and community-level resources such as networks, leadership skills, culture, trust, and knowledge has been increasingly recognised (Stewart, 1999). This expanded view of resources is particularly relevant for community-based programmes, which aim at marshalling the community’s internal resources, often referred to as community capacity, by engaging community input and utilising community competence, institutions, and networks (O’Connor, 1995; McLeroy et al., 2003; Coggan & Bennett, 2004).

The community’s capacity to mobilise to address safety issues influences the programme’s level of human, relational, and structural resources, which are the three principal intangible resources typically identified at the organisation level (Teece, 1998). The human resources of an organisation are the individual knowledge, skills, and abilities inherent in the personnel. Structural resources are supportive organisational capabilities, such as technologies, methodologies, and goals that enable the organisation and its personnel to function.
Structural resources are owned by the organisation, in contrast to human resources, which are owned by the individuals (Roos et al., 1997). Relational capital lacks a precise definition, but unmistakably embraces the notion that a web of relationships by individuals within the organisation and between organisation members and external individuals/organisations is a valuable resource. Relational capital may be viewed broadly as the capacity to collaborate (Bounfour, 2003). Human and structural resources are predominantly internal to the organisation, while the inclusion of relational capital adds an important external dimension to the mix (Sveiby, 1997).

### 3.3.2. Delivery of programme components

Available resources are used to deliver different injury prevention programme components. Delivery refers to the quantity and quality of different programme activities, materials and facilities (Clarke & Dawson, 1999). Delivered programme components can be divided into active and passive strategies, which can be seen as opposite poles of a dimension defined in terms of the frequency with which action is required of individuals and the amount of effort required each time (Baker, 1981).

Active strategies are aimed at modifying individuals’ behaviours so that they act on their own behalf to protect themselves from injury. Active strategies typically involve some form of education (Christoffel & Gallagher, 1999).

Passive strategies involve structural modification by means of building safety into physical surroundings and products as a constant feature, e.g. impact-absorbing playground surfaces, thus eliminating the need for action on the part of individuals to have an effect (Barss et al., 1998). Instead of focusing on improving the safety of one person at a time, passive strategies have the capacity to benefit all persons exposed to the environments or products (Stokols, 1996). Structural and
behavioural modification often derives from legislation and regulation (Robertson, 1998).

### 3.3.3. Exposure to programme components

It is important to distinguish between the *delivered* dose of injury prevention programme activities, materials, and facilities, and the *received* dose, i.e. exposure to these components. Whereas delivery is a function of efforts of the programme providers, exposure is a characteristic of the participants (Linnan & Steckler, 2002).

Active strategies aimed at behavioural modification require community residents’ exposure to and awareness of the programme components to have an effect in terms of injury risk reduction. In contrast, exposure to passive strategies reduces the injury risk regardless of community residents’ awareness of the structural modifications (assuming the components have been properly implemented and are fully functional).

### 3.3.4. Attitudinal effects

The immediate effects of injury prevention programme components aimed at behavioural modification are those that participants experience as a direct result of being exposed to and made aware of programme components, e.g. participating in programme activities or receiving safety devices. For most social programmes, these effects involve psychological effects in terms of attitudinal responses (Rossi et al., 2004). An attitude is made up of “feelings, likes and dislikes, behavioural intentions, thoughts, and ideas” (Hogg & Vaughan, 1998, page 118). It is generally accepted that attitudes are composed of three components: (1) cognitive, which constitute one’s knowledge, thoughts, beliefs, and ideas about something; (2) affective (often referred to as “attitudes”), which are feelings that something evokes; and (3) conative, which is a tendency or disposition to act in certain ways.
toward something (as opposed to the actual acting itself) (Gergen & Gergen, 1986).

Active strategies are typically based on the assumption that attitudinal modification leads to adoption of the recommended behaviour to reduce the injury risk (Sleet & Gielen, 2004). However, there are also more direct approaches which do not rely on attitudinal changes to achieve behavioural change, e.g. skills training and procedures for providing rewards for desired behaviour or sanctions for unsafe behaviour (Wilde, 1998; Lund & Aarö, 2004). This possibility is illustrated in figure 4 by the arrow connecting awareness of programme components to modified behaviour, thus bypassing attitudinal modification.

### 3.3.5. Injury risk effects

The intermediate effects of injury prevention strategies and measures can be assessed in terms of changes in objective injury risk, which can be divided into behavioural and structural risk. Behavioural risk reduction is typically dependent on active strategies that yield the desired behavioural changes.

Structural risk can be reduced through structural modification of the environment and products, which is represented by the extent to which passive-strategy components are actually taken up in practice and functioning as intended, e.g. fences around swimming pools are properly erected and maintained, and gates kept closed.

Few strategies are truly passive, however, as they typically require some degree of behavioural effort in order to impact structural risk, e.g. actually installing a smoke detector and making sure the batteries are charged (Pless & Hagel, 2005). Hence the arrows in figure 4 connecting passive strategies to modified behaviour and modified structure.
3.3.6. Safety effects

Reductions in behavioural and/or structural injury risks are aimed at enhancing safety. However, reduced objective risks do not automatically lead to reduced injury rates, i.e. increased objective safety, because individuals may modify their behaviour in response to their interpretation of risk/safety in different situations and environments. This behavioural change could alter objective safety, which is illustrated by the arrow in figure 4 connecting subjective risk/safety to objective safety.

It is also possible that subjective risk/safety changes occur in response to changes in objective safety, which is why the arrow connecting subjective risk/safety and objective safety points both ways. For example, laws of compulsory seat belt wearing enacted in Sweden and Canada yielded substantially increased seat belt use as people became aware that seat belts did in fact save many lives (Fhanér & Hane, 1979; Jonah & Dawson, 1982). This evidence of increased objective safety appeared to foster more positive attitudes toward seat belt use, thus enhancing people’s subjectively experienced safety when wearing seat belts.

A direct relationship between structural risk and objective safety can only be assumed to exist when individuals are unaware of any changes in safety/risk and therefore do not alter their behaviours. This is illustrated in figure 4 by the arrow connecting structural risk with objective safety, thus bypassing subjective safety.

This conceptualisation of subjective risk/safety as a precursor to objective safety represents a noteworthy digression from some previous frameworks/models for evaluating injury prevention programmes (e.g. Sanderson et al., 1988; Lindholm, 1996; Ekman et al., 1999a; Shannon et al., 1999; Thompson & Sacks, 2001), all of which have assumed more of a direct linkage from exposure via injury risk to injury occurrence.
3.3.7. Context

The context is conceptualised as being external to the programme. However, community-based programmes are embedded in the community, typically involving community members and local organisations in the planning and delivery of programme components, which clearly blurs the boundary between “programme” and “context.” Still, there is an organisation charged with implementing interventions and strategic planning, and programme operation is led by a core group of people, which may be considered the “programme”; everything else becomes the programme’s “context.” The context extends beyond the community, as the programme effects may be influenced by wide, far-reaching societal trends (Merzel & D’Afflitti, 2003).

Interventions to enhance the health and safety of populations typically involve long and complex causal pathways that can be affected by numerous contextual factors. This means that the same programme will have different effects in different contexts. Indeed, the effects of population-based programmes implemented in the community are rarely, if ever, attributable solely to the interventions and intervening processes, but are also determined by contextual variables (Chen & Rossi 1983; Rychetnik & Frommer, 2000). Epidemiologists refer to “effect modification” when the intervention-outcome association varies according to external characteristics (Victora et al., 2004).

Communities vary in terms of population size, cultural homogeneity, and risk factors such as demographic variables (e.g. age, sex, and ethnic characteristics) and socio-economic variables (e.g. income, employment, and education). Geographically-defined communities tend to vary with regard to climate, topography, and infrastructure. Community variations impact the causes, types, and prevalence of injury. These variations also influence the programme resource requirements, the feasibility of different strategies, and the extent to which the community population can be reached and exposed to the
programme (Miller & Adams, 1989; Barss et al., 1998; Melinder, 2000; Moodie, 2002; Steenland et al., 2002).

3.4. Challenges to evaluating community-based injury prevention programmes

An important aspect of injury prevention research is evaluation of the effects of interventions and programmes. Evaluation is designed to help make health and safety programmes work better and to allocate resources to more effective programmes (Weiss, 1998). Evaluation is needed to assess results, to measure if goals have been met, and to find out if the interventions were appropriate and effective. These findings can be fed back into the planning process in order to improve practice (Benson, 1995; Vincenten, 1997; Naidoo & Wills, 2000; Tones & Green, 2004). Evaluation can also contribute to the broader theory and knowledge base of health and safety programmes (Clarke & Dawson, 1999; Doll et al., 2003).

Despite widespread application of community-based injury prevention programmes, rigorous research evaluating the effectiveness of these initiatives is lacking (Rivara, 2001). It is widely acknowledged that the evaluation of community-based programmes is complex and poses many methodological challenges (Ekman et al., 1999b; Cummings & Koepsell, 2002; Hodge, 2002; Nilsen, 2005). This section discusses key issues pertaining to study design, validity of study findings, and statistical power of evaluations of community-based injury prevention programmes.
3.4.1. Study design

A proper study design is required to determine if a particular effect is actually caused by a particular programme and to separate the effect from other circumstances that produce similar effects. While the randomised controlled trial (RCT) is considered the gold standard for establishing causality, most public health interventions cannot be evaluated using this study design (Feinleib, 1996; Shannon et al., 1999; Hodge, 2002; Moller, 2004; Victora et al., 2004; Des Jarlais et al., 2004). Because community-based health and safety programmes seek to benefit all members of a community by achieving population-level effects, the appropriate unit of analysis is the community (Koepsell et al., 1992; Merzel & D’Afflitti, 2003). Although there are examples of RCTs of single injury prevention measures where the individual is the unit of analysis, this type of design has not been applied in evaluations of community-based injury prevention programmes for practical, financial, and ethical reasons (Turner & McClure, 2004).

The quasi-experimental study design is a far more realistic ideal for the evaluation of community-based programme efforts (Nutbeam, 1998; Shannon et al., 1999; Tones & Green, 2004). This design is “experimental” in the sense that the intervention community is manipulated with interventions and the evaluator observes the changes against one or more control (comparison or reference) communities without such manipulation. It is “quasi”-experimental in so far as the evaluator cannot randomly allocate communities or control every aspect of the delivery of the programme and the population’s exposure to the programme components (Cook & Campbell, 1979). A quasi-experimental study design typically involves the measurement of pre and post-implementation (before and after) effects for an intervention community and for one or more control communities that do not receive the interventions (Frankfort-Nachtman Nachmias & Nachmias, 1996).

Another common study design is the historical control approach, which measures the intervention community’s effects pre and post-implementation so that the community in effect acts as its own control,
without other comparison groups (Turner & McClure, 2004). The historical control design (often referred to as control community or contemporary control) is considerably weaker than a quasi-experimental design because without comparison data from another community or other relevant external comparisons it is not possible to be sure that observed changes would not also occur to a greater or lesser degree in a community which did not receive the programme (Övretveit, 2000). The historical design was predominantly used to evaluate community-based injury prevention programmes prior to the 1990s. Since then, quasi-experimental designs have become the most frequent (Towner & Dowswell, 2002; Turner & McClure, 2004; Nilsen, 2005).

Historical control designs can add strength to inferences about effects of a programme through the use of longitudinal (time-series) measurements, e.g. by repeating measurements at different times prior to programme implementation and after the programme has been implemented (Doll et al., 2003). Other time series designs include the use of one pre-measurement and a series of post-measurements or simply a series of measurements over time (Frankfort-Nachmias & Nachmias, 1996).

The study designs can also be enhanced by different partial comparisons (Yin & Kaftarian, 1997). For instance, intervention community effects (such as injury incidence) can be compared with regional or national averages as a broader benchmark (Hoffmeister & Mensink, 2004). It is also possible to compare results pertaining to targeted and non-targeted injury categories in order to obtain a second measure of the injury categories which are not expected to be affected by the programme (Bjerre & Jonell, 1998).
3.4.2. Validity of results

Evaluators are interested in discerning effects over-and-above what could have been expected if a community-based health or safety programme had not been implemented. However, it is difficult to isolate the effects of comprehensive programmes in dynamic, real-world community settings due to a number of confounding factors (Benson, 1995). A considerable challenge to evaluations of community-based programmes is ensuring there is both internal and external validity.

Internal validity is the assurance that the results can be attributed to the programme being evaluated. External validity is the assurance that the results obtained from an evaluation can be expected to apply anywhere else under typical conditions (Cook & Campbell, 1979). Internal validity is a measure of the extent to which the study findings are real and not the result of bias, while external validity is a measure of how generalisable the findings are to other settings (Britton & Thorogood, 2004).

There are many sources of bias that must be minimised to enhance the internal validity (Donaldson et al., 2002). It is important to identify and select matching communities with comparable characteristics. Selection bias occurs when the intervention and control communities are not identical. When the communities under comparison differ at the outset of the evaluation, it is difficult for evaluators to separate programme effects from other effects (Green & Lewis, 1986). Control communities in evaluations of community-based health and safety programmes have often been selected on the basis of some easily defined community characteristics, e.g. similarity in community size (Koepsell et al., 1992). However, communities may differ with regard to any number of factors that can affect the programme effects, including demographic factors (e.g. community population age, sex, and ethnical characteristics), socio-economic factors (e.g. the community’s income status, education level, and employment rate), and miscellaneous factors such as climate, geography, and
3. Framework

infrastructure (Miller & Adams, 1989; Barss et al., 1998; Moodie, 2002; McClure et al., 2005). Theoretically, the best factor on which to match intervention and control communities is one that is highly correlated with change in the effect variable(s). However, in practice, there is often limited knowledge about community characteristics that allows evaluators to match such factors (Koepsell et al., 1992).

Diffusion (or contamination) effects pose evaluation challenges as well. These effects occur when the control community population is exposed to elements of the intervention due to the movement of individuals in and out of the communities (Green & Lewis, 1986). Evaluators of community-based injury prevention programmes have often chosen control communities in close proximity to the intervention community on the grounds that it helps to reduce selection bias due to similarity of many demographic factors between nearby areas (Nilsen, 2005). However, this strategy means that diffusion effects cannot be ruled out, thus reducing the chances of finding a significant difference between the communities under comparison (Pless, 1996).

Trend (or history) effects also present challenges to evaluations of community-based health and safety programmes. These effects refer to all events that occur during the time of the study that may affect the communities and provide rival explanations for the change in the effect variables (Green & Lewis, 1986). These external effects from regional or national injury prevention activities or safety campaigns directed toward the general public are frequently cited trend effects in evaluations of community-specific injury prevention programmes (Guyer et al., 1989; Schwarz et al., 1993; Jeffs et al., 1993; Davidson et al., 1994; Day et al., 2001). The difficulty of detecting sharp differences between intervention and control communities in evaluations of many community-based health promotion programmes has been attributed to both contamination of control communities and to broad societal changes affecting health-related attitudes and behaviours (Koepsell et al., 1992; Feinleib, 1996; Merzel & D’Afflitti, 2003; Hoffmeister & Mensink, 2004). Potential trend effects may be revealed through the use of external regional and/or national data
for reference (Hoffmeister & Mensink, 2004). Longitudinal designs with repeat measurements taken at different pre and post-implementation periods in intervention and control communities may also help the evaluator identify trend effects (Kopjar et al., 2000).

Testing effects occur when the process of collecting data creates an effect which changes the phenomena being studied (Green & Lewis, 1986). A variant of this effect has been referred to as registration bias in some evaluations of community-based injury prevention programmes: the programme affects not just the occurrence of injuries, but also the reporting of those injuries. This is likely to be reflected in the number of reported minor injuries treated in emergency departments, although there is inconclusive evidence whether programme awareness increases or lowers people’s threshold to seek medical help (Tellnes, 1985; Guyer et al., 1989; Bjerre & Sandberg, 1998). Testing effects can be revealed by reporting on the ratio of major to minor injuries, before and after programme implementation, in order to assess not only the occurrence of injuries, but also the reporting of those injuries (Shannon et al., 1999).

While selection, diffusion, trend, and testing effects are frequently addressed in evaluations of community-based health and safety programmes, less attention is typically given to maturation, regression-to-mean, and instrumentation effects. Maturation effects involve biological, psychological, and social processes that produce changes in the individuals or communities with the passage of time (Cook & Campbell, 1979). Regression-to-mean bias is seen in intervention and/or control communities with high or low baseline results, which are likely to be more susceptible to changes in rates (Green & Lewis, 1986). As with trend effects, maturation and regression-to-mean effects can be disclosed by using external regional and/or national data for reference (Hoffmeister & Mensink, 2004) and/or by using longitudinal designs with repeat measurements at different times, pre and post-implementation, for intervention and control communities (Kopjar et al., 2000).
Instrumentation refers to the reliability of the data collection and measurement processes. The evaluator has to show that repeated measurements with the same instrument under unchanged conditions will yield the same result (Green & Lewis, 1986). Instrumentation effects can occur when there is a change in the means of obtaining injury data, e.g. transferring from manual injury registration to a computerised system. These effects can be addressed by examining the data collection measures to assess whether there have been any changes (Shannon et al., 1999).

Although most evaluations of community-based health and safety programmes address some issues of internal validity, less is typically said about external validity (Dzewaltowski et al., 2004). Information pertinent to external validity includes details of the programme context, resources provided for programme operation, quality and quantity of delivered programme components, and the degree to which the community population was exposed to the programme. These are factors that could potentially influence a programme’s effects and thus the generalisability of a particular evaluation study’s results (Shannon et al., 1999). Inadequate or non-transparent reporting makes it difficult to understand which factors affect the central elements in programme success or failure (Cart Project Team, 1997; Des Jarlais et al., 2004).

### 3.4.3. Statistical power

Community-based health and safety programmes are conventionally considered successful if they result in statistically significant changes in the effect variables. However, a major challenge to evaluating the effects of these programmes is the low statistical power typically obtained as a result of small effect sizes and small samples (Merzel & D’Afflitti, 2003). Statistical power is a function of the effect size to be detected, the sample size, the alpha level set by the evaluator (usually $p<0.05$), and the type of statistical test employed. The last two factors offer limited opportunity for improvement (Lipsey, 1993).
Population-level programmes promote changes that will be adopted by the majority of the population, which means that the expected proportional benefits to individuals may be small. This makes it difficult to detect effects in many individuals who have been exposed to these programmes (Britton et al., 1998). It has been suggested that researchers and practitioners tend to expect too much from community-based health and safety programmes, and that they fail to realise that widespread gains in public health often appear small (Cart Project Team, 1997). Indeed, evidence suggests that the effect size of community-based health and safety programmes usually is much smaller than the 20% to 30% often expected from individual-oriented health interventions (Fishbein, 1996).

If the effect size is constrained, the only remaining parameter is sample size. However, it is rarely possible to obtain sufficiently large number of communities to improve the statistical power of evaluations of community-based health and safety programmes (Lipsey, 1993; Cart Team, 1996; Kopjar et al., 2000). Some evaluators have recommended that at least 10 communities per study condition (intervention and control) are needed to obtain sufficient statistical power to detect differences between intervention and control communities (Koepsell et al., 1992). However, the inclusion of multiple communities is expensive. Moreover, it may simply not be possible to identify the appropriate number of similar communities to take part in an evaluation. In addition, it may not be logistically practical to deliver a programme to multiple communities (Cart Project Team, 1997). An ethical issue is whether control communities should be denied something of potential or known benefit (Doll et al., 2003).
3.5. A review of the evidence of effectiveness of community-based injury prevention programmes

There is a logical sequence in the progression of research from basic science that ultimately leads to implementation of community-based programmes to prevent injuries (Gielen & Collins, 1993). Efficacy trials, where the individual is the unit of analysis, show the degree to which specific interventions work under idealised conditions. Evaluations of community-based programmes are used to assess how well such actually work in community settings, i.e. population-level effectiveness (Teutsch & Harris, 1996; Petridou, 2003). The provision of research-based evidence of effectiveness is necessary to inform injury prevention programmes (Coggan & Bennett, 2004).

In clinical research, greater attention to scientific evidence of efficacy and effectiveness has led to the movement for Evidence-Based Medicine (EBM) and the establishment of the Cochrane Collaboration (Victora et al., 2004). An important element of EBM is systematic reviews, which attempt to assemble the evidence base, “the sum of total research evidence” (Naidoo & Wills, 2001, page 297), on the results of health care interventions. Systematic reviews are considered one of the best sources of evidence in EBM, but this research methodology has also been applied in other research fields, including injury prevention, in order to provide state-of-the-art evidence on what works and what does not (Ament et al., 2002; Farquhar & Brown, 2002).

Approximately 50 Collaborative Review Groups have been established within the Cochrane Collaboration network, including the Cochrane Injuries Group (Ameratunga, 2004).

To obtain an overview of the evidence base regarding community-based injury prevention programmes, a review of reviews was conducted for this thesis. Published systematic reviews of evaluated programmes were examined with regard to: (1) how effectiveness was measured; (2) key findings concerning evidence of effectiveness; and (3)
key findings regarding factors that were found or believed to have influenced effectiveness.

The following search strategy was used for this review: (systematic) AND (review*) AND (injur* OR wound* OR trauma OR fracture*) AND (community OR communities OR population). The data bases searched were PubMed, PsycINFO, and CINAHL. Separate searches of the journals Accident Analysis and Prevention, Injury Prevention, International Journal of Injury Control and Safety Promotion, Journal of Safety Research, and Safety Science were performed. Reference lists of articles and books were also examined. The author’s own systematic review (i.e. study A) was excluded.

3.5.1. Characteristics of the systematic reviews

Nine systematic reviews were found, as shown in table 1. The reviews were published between 1993 and 2005, with the majority being published in 2004 and 2005. Each review included between three and 28 individual programmes. One of the reviews (Spinks et al., 2005a) covered programmes targeting all injury types and all age categories. The other eight reviews assessed programmes targeting specific types of injuries and/or age groups; five of these reviews concerned programmes targeting childhood injuries.

The inclusion criteria were similar in all reviews, as most covered programmes applying more than one strategy and targeting a whole community or groups of individuals within the community. However, four reviews accepted only programmes that had been evaluated using a control (comparison) community design.
Table 1: Characteristics of the systematic reviews

<table>
<thead>
<tr>
<th>Study</th>
<th>Number of programmes: prevention targets (number of programmes)</th>
<th>Study inclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gielen &amp; Collins (1993)</td>
<td>8 programmes: burn injuries (3); motor vehicle injuries (3); bicycle-related head injuries (1); multiple childhood injuries (1).</td>
<td>Targeted whole populations or communities.</td>
</tr>
<tr>
<td>Klassen et al. (2000)</td>
<td>28 programmes: injuries in children related to bicycle (12), motor vehicle restraint use (5); pedestrian safety (4), all injury types (4); adolescent alcohol use and vehicle safety (3).</td>
<td>Intervention &quot;between an individual-based approach and a state or nationwide one&quot;; targeted 0-19 years; CC.</td>
</tr>
<tr>
<td>Spinks et al. (2004)</td>
<td>9 programmes: all injury types in children 0-14 years. &gt; 1 strategy; targeted a whole community or group(s) of individuals; CC or HC.</td>
<td></td>
</tr>
<tr>
<td>Turner et al. (2004)</td>
<td>4 programmes: pedestrian injuries in children 0-14 years. &gt; 1 strategy; targeted a whole community or group(s) of individuals; CC or HC.</td>
<td></td>
</tr>
<tr>
<td>McClure et al. (2005)</td>
<td>5 programmes: fall-related injuries in older people, 65 years and older. Targeted a whole community or a large part of a community; multiple strategies; CC.</td>
<td></td>
</tr>
<tr>
<td>Spinks et al. (2005a)</td>
<td>7 programmes: WHO Safe Communities (all injury types in all age categories). Targeted whole populations within a community or specific sub-populations (e.g. children); CB programmes based on the WHO Safe Community model; CC.</td>
<td></td>
</tr>
<tr>
<td>Spinks et al. (2005b)</td>
<td>13 programmes: use of bicycle helmets in children 0-14 years. &gt; 1 strategy; targeted a whole community or group of individuals therein; targeted children 0-14 years; CC or HC.</td>
<td></td>
</tr>
<tr>
<td>Turner et al. (2005)</td>
<td>3 programmes: burns and scalds in children 0-14 years. Targeted a whole community or a large part of a community; multiple strategies, targeting families with children 0-14 years; CC.</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations used: IR = injury rates; CB = community-based; HC = historical comparison/control study design; CC = community comparison/control study design.

3.5.2. Results of the systematic reviews

Table 2 presents the main findings of the studies. Effectiveness was predominantly measured as injury rate reductions, although two reviews (Gielen & Collins, 1993; Klassen et al., 2000) included evaluations based on a number of outcome measures, including changes in receipt and use of safety devices, safety knowledge, safety behaviour, and injury severity. Injury rates in the individual studies
were mostly based on hospitalisations (i.e. medically treated injuries) although some studies also relied on presentations to emergency departments or similar health care units (i.e. non-hospitalisations). The data sources for injury rates were not clarified in all the systematic reviews, however.

The findings from the nine systematic reviews revealed considerable variation regarding the effectiveness of the evaluated programmes. Programmes targeting fall-related injuries among elderly (McClure et al., 2005), pedestrian injuries in children (Turner et al., 2004), and bicycle helmet use among children (Spinks et al., 2005b) demonstrated the most convincing evidence of effectiveness. The evidence was less compelling for the programmes targeting more than one injury category, e.g. different types of injury (such as falls or burns) and more than one age category (Spinks et al., 2005a). The two reviews covering a variety of programmes (Gielen & Collins, 1993; Klassen et al., 2000) reported mixed effectiveness for the programmes. Three reviews (Spinks et al., 2004; Nixon et al., 2004; Turner et al., 2005) concluded that there were too few studies to allow conclusions to be drawn about the effectiveness of the programmes.

The reviews were generally outcome-oriented and focused on measuring effects in terms of injury rate changes. Less attention was given to analysing actual or potential facilitators and barriers to achieving programme effectiveness. Four of the reviews (Spinks et al., 2004; Nixon et al., 2004; McClure et al., 2005; Spinks et al., 2005b) did not even attempt to identify or discuss factors that may have influenced programme effectiveness. Five reviews did seek explanations for the levels of effectiveness attained. These reviews identified a broad range of factors that influenced programme effectiveness: programme duration, resource availability, involvement of community members and stakeholders, theoretical grounding of interventions, complexity of interventions, multiplicity of interventions, adequacy of the implementation of the interventions, tailoring of interventions, and the economic status of the intervention communities.
Table 2: Key results of the systematic reviews

<table>
<thead>
<tr>
<th>Study</th>
<th>Measure(s) of effectiveness</th>
<th>Evidence of effectiveness</th>
<th>Factors that influenced or may have influenced programme effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gielen &amp; Collins (1993)</td>
<td>Safety knowledge; safety behaviour (O and SR); receipt of safety devices (SR); use of safety devices (O); IR; severity of injuries.</td>
<td>Did not draw conclusions regarding the overall PE although the results were mixed; to provide better evidence regarding PE, evaluations need to use more CC.</td>
<td>Programmes had inadequately short duration, with 5 of the studies lasting less than 1 year; the programmes had theoretical shortcomings in that they treated the community as the sites rather than the sources of the programmes.</td>
</tr>
<tr>
<td>Klassen et al. (2000)</td>
<td>Safety behaviour (O and SR); use of safety devices (O and SR); IR.</td>
<td>The programmes were effective at increasing some safety practices, including bicycle helmet use and car seat among children; less effective to increase child pedestrian safety, increase adolescent vehicle safety by reducing drinking and driving behaviours, and several other categories of childhood injuries; when possible, RCTs should.</td>
<td>Programmes need to use multiple strategies grounded in theory of behavioural change; interventions should be tailored to meet unique community needs; community stakeholders should be included in the programme development.</td>
</tr>
<tr>
<td>Nixon et al. (2004)</td>
<td>IR (poisoning).</td>
<td>Only 1 study provided convincing evidence of PE; targeted strategies dealing with only 1 substance may be more effective than a general poisoning prevention approach; paucity of studies from which evidence regarding the effectiveness of CB childhood poisoning prevention programmes can be obtained.</td>
<td>Did not identify or discuss specific factors that may have influenced PE.</td>
</tr>
<tr>
<td>Spinks et al. (2004)</td>
<td>IR (all causes).</td>
<td>Only 3 of the 7 studies with CC found significant effect of the programme; 2 studies without CC noted significant reductions in IR; insufficient studies and too great a variation in the results to provide definitive evidence as to the effectiveness of CB programmes for the prevention of injuries in children.</td>
<td>Did not identify or discuss specific factors that may have influenced PE.</td>
</tr>
<tr>
<td>Turner et al. (2004)</td>
<td>Safety behaviour (O); IR.</td>
<td>The programmes were largely effective in reducing the incidence of childhood pedestrian injuries.</td>
<td>PE depends on the complexity of the interventions implemented, which in turn relies on the amount of resources available.</td>
</tr>
</tbody>
</table>

Table continues on next page. Abbreviations used: IR = injury rates; CB = community-based; CC = community comparison/control study design; RCT = randomised control trial; PE = programme effectiveness; SR = self-reported; O = observed.
### 3.5.3. Discussion of the results

This “meta-systematic” review demonstrates that effectiveness is predominantly measured as injury rate changes. However, this does not preclude the possibility that effectiveness was measured more broadly in the individual evaluation studies on which the nine reviews are based.

The review also shows that evidence regarding the effectiveness of community-based injury prevention programmes is inconsistent. Some of the programmes targeting specific injury categories (e.g. specific injury types and/or age groups) were successful, while more broadly targeted programmes appear to have achieved more mixed results. However, it can be argued that narrowly targeted programmes are not actually multifaceted population-based intervention programmes in accordance with the assumptions of the community-based approach (as
described earlier in this chapter). Indeed, studies of multifaceted programmes have shown that it is quite possible to obtain excellent results for specifically targeted injury types or age categories without necessarily achieving a favourable population outcome, i.e. lowering the total injury incidence of the whole community (Kopjar et al., 2000).

With regard to inclusion criteria, the systematic reviews predominantly defined community-based programmes as those that applied more than one injury prevention strategy and targeted groups of individuals or the whole community. However, it is troubling that the reviews did not incorporate community member participation or intersectoral collaboration as inclusion criteria, although these are two key principles of the community-based approach.

In sum, the results clearly demonstrate that there is a paucity of systematic reviews and evaluation studies that can explain why community-based injury prevention programmes are effective. Indeed, it is evident that far more effort is spent on attempts to answer the question “does it work?” than investigating factors that influence programme effectiveness. Thus, this review of reviews highlights the need for further research investigating why and how community-based injury prevention programmes work, if indeed they do work.
4. Aims

This chapter presents the aims of this thesis. The general aim of the thesis is first defined, followed by a description of the specific aims of the individual studies and the research questions addressed in the thesis.

4.1. General aim

The overall aim of this thesis is to contribute to improved understanding of the community-based approach to injury prevention. This is achieved by assessing the effectiveness of community-based injury prevention programmes and by attempting to open the “black box” of community-based programmes to clarify why and how the programmes work.

4.2. Specific aims and research questions

The aim of research can be said to be to discover answers to questions through the application of systematic procedures. Research questions organise the project by giving it direction and coherence, delimiting the scope of research, and pointing to the research strategy, methods, and data that will be needed (Punch, 1998).

Research questions can be grouped into three main types: “what,” “why,” and “how” questions (Blaikie, 2003). The studies of this thesis
address different aspects of all three types of research questions, by posing the following questions in relation to the community-based approach to injury prevention:

- “Does it work?”
- “Why does it work?”
- “How does it work?”

Table 3 provides information on the aims of the studies (as formulated in the studies) and the particular research question addressed in each study.

“What” questions are usually answered before addressing “why” or “how” questions (Blaikie, 2003), which is the scheme adapted within the sequence of the thesis’ seven studies. “What” questions require descriptive knowledge, which is a first step toward explanatory knowledge, which is needed to answer “why” or “how” something works. In general, “what” questions seek description, while “why” and “how” questions seek explanation or understanding. Description is more restricted than explanation and understanding; it is possible to describe without explaining or understanding, but it is not really possible to explain or understand without describing (Punch, 1998).

The question “does it work?” was addressed in studies A and B, by examining the extent to which community-based injury prevention programmes have been effective. This is a quintessential “what” question, which is usually directed toward describing the characteristics of some social phenomena (Blaikie, 2003). Study A is a systematic review of 16 evaluated community-based injury prevention programmes. The study assessed the reported effectiveness (measured as injury rates) of the programmes. Study B examined the injury rate development between 1987 and 2002 for 14 Swedish municipalities that have been certified WHO Safe Communities because they operate community-based injury prevention programmes that fulfil certain designation criteria.
Table 3: Aims of and research questions addressed in the studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Aim (as formulated in the studies)</th>
<th>Research question addressed in the study</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>What Makes Community-Based Injury Prevention Work? “The aim of this study is to examine existing evaluations of multi-strategy, multi-target community-based injury prevention programmes with regard to reported effectiveness. The objective is to contribute to a better understanding of modern community-based injury prevention.”</td>
<td>“Does it work?” and “Why does it work?”</td>
</tr>
<tr>
<td>B</td>
<td>Effectiveness of Community-Based Injury Prevention “This study investigates the injury rate levels, changes, and trends between 1987 and 2002 for the 14 Swedish municipalities designated as WHO Safe Communities. The aim is to assess the effectiveness of the WHO Safe Community model for community-based injury prevention, as it has been applied in Sweden.”</td>
<td>“Does it work?” and “Why does it work?”</td>
</tr>
<tr>
<td>C</td>
<td>Towards Improved Understanding of Injury Prevention Program Sustainability “The purpose of this study is to explore factors that contribute to or detract from the sustainability of community-based injury prevention programmes. ... The aim of this study is to contribute to improved understanding of the conditions under which injury prevention programmes are most likely to attain sustainability.”</td>
<td>“Why does it work?”</td>
</tr>
<tr>
<td>D</td>
<td>Strategies and Goals of Community-Based Injury Prevention Programs “The aim was to identify approaches that have been found to be most effective in achieving safety goals and to identify the most important criteria for selection of strategies and measures for programmes. The aim was also to determine the extent of the use of goals for community-based injury prevention programmes and the purposes of such goals.”</td>
<td>“Why does it work?”</td>
</tr>
<tr>
<td>E</td>
<td>Using Local Injury Surveillance for Community-Based Injury Prevention “The aim of this study is to investigate the extent of access to and use of local injury surveillance data among 41 community-based injury prevention programmes in Scandinavia (25 programmes) and Canada (16 programmes). The study examines the extent to which local injury data are collected, assembled into documents for analysis, linked to injury prevention action, and used for evaluation.”</td>
<td>“Why does it work?”</td>
</tr>
<tr>
<td>F</td>
<td>The Theory of Community-Based Health and Safety Programs – A Critical Examination “This paper examines whether there are shortcomings in the theoretical underpinning of the community-based approach that could explain the lack of strong evidence of the effectiveness of health and safety programmes.”</td>
<td>“Why does it work?”</td>
</tr>
<tr>
<td>G</td>
<td>The How and Why of Community-Based Injury Prevention – A Conceptual and Evaluation Model “The aim of this model is to offer a way of thinking about community-based injury prevention programs and provide an overall structure and useful indicators for evaluating these programs, thus contributing to an improved understanding of the mechanisms involved in achieving successful implementation and attaining effectiveness, while simultaneously encouraging more widespread application of credible quality evaluations in this field.”</td>
<td>“Why does it work?” and “How does it work?”</td>
</tr>
</tbody>
</table>
Different aspects of the question “why does it work?” were addressed in all studies, by examining a number of factors that may influence the effectiveness of community-based programmes. “Why” questions ask for explanations for or the reasons for the existence of characteristics in a particular phenomenon. These questions are directed toward understanding or explaining the relationships between events or within activities (Blaikie, 2003).

In addition to assessing programme effectiveness, study A investigated factors that influenced (or may have influenced) the effectiveness of the 16 programmes under study. While the primary aim of study B was to describe the development of injury incidence for the municipalities, the study also included a discussion of factors that could explain why the programmes in the municipalities did or did not produce the desired effects.

Study C explored factors facilitating or hindering the sustainability of Swedish community-based injury prevention programmes. Sustainability is considered a necessary condition to achieve community-based injury prevention programme effectiveness (Elder et al., 1993; Brownson et al., 1999; Merzel & D’Afflitti, 2003; Doll et al., 2003). Hence, the study of factors that influence programme sustainability indirectly addressed the question of why programmes attain effectiveness.

Studies D and E investigated the importance of some factors that previous research has identified as crucial for attaining injury prevention programme effectiveness. Study D examined the prevalence and purposes of programme goals among Scandinavian community-based injury prevention programmes and which strategies that have been found most effective in achieving goals. Clearly defined goals have been identified as an essential component of successful health programmes (Moller, 1992; Ader et al., 2001; Bourdages et al., 2003). The value of combining different strategies is emphasised in the injury prevention literature (e.g. Barss et al., 1998; Christoffel & Gallagher, 1999). Study E examined the use of local injury surveillance in

Study F generated a theory of the community-based approach to health and safety programmes based on existing descriptions in the literature and examined the plausibility and practical application of the theory, thus addressing the question “why does it work?”

Theory, while having different meanings in different contexts (Frankfort-Nachmias & Nachmias, 1996), may be understood as a set of formulations designed to explain facts and observable events. Formulations might include empirical facts, definitions or propositions related in some meaningful way to facilitate explanation of observable phenomena (Mason & Bramble, 1978). The essential motivation behind a theory is the attempt to explain whatever is being studied. A theory is often proposed as an answer to a “why?” question (Punch, 1998).

Study G developed a conceptual and evaluation model for community-based injury prevention programmes by clarifying the causal mechanisms by which these programmes are supposed to operate, thus addressing the question “how does it work?” in addition to “why does it work?” “How” questions are concerned with how change is achieved (Blaikie, 2003). Study G drew on theory-based evaluation, which is an approach to evaluation that has been advocated to open the black box of complex programmes to clarify why and how the programmes work (Stame, 2004).

The concept of “model” is sometimes used interchangeably with “theory” as both can be tools for organising knowledge and explanation. In fact, models are sometimes referred to as “mini-theories,” used as steps in the development of theories (Graziano & Raulin, 2000). Models are generally understood as being less general and somewhat less developed than theories (Mason & Bramble, 1978).
A model is an abstraction from reality that orders and simplifies the view of reality by representing its essential characteristics (Frankfort-Nachmias & Nachmias, 1996). The model in study G abstracts certain aspects of injury prevention programmes, focusing on the causal mechanisms of the programmes.
5. Materials

This chapter describes the materials, i.e. study objects, of this thesis. The chapter begins by providing an overview of the materials used in the different studies. Then follows a brief description of the main study objects of the thesis, i.e. community-based injury prevention programmes that operate in communities that have been designated Safe Communities by the WHO Safe Community and Canadian Safe Community Foundation networks.

5.1. Overview of materials used in the thesis

The main materials of this thesis are community-based injury prevention programmes in Scandinavia and Canada, as shown in table 4. Study A encompasses evaluations of 16 community-based injury prevention programmes (of which four are Swedish WHO Safe Communities and are also part of study B). Study B is based on injury data from 14 Swedish municipalities that have been certified WHO Safe Communities because they have community-based injury prevention programmes that fulfil certain designation criteria.

Study C features interviews with key informants for 10 of the 14 community-based injury prevention programmes operating in Swedish WHO Safe Communities. Study D covers community-based injury prevention programmes in 25 Scandinavian WHO Safe Communities: 13 Swedish, 9 Norwegian, and 3 Danish. The same 25 Scandinavian WHO Safe Community programmes are analysed in study E, along with 16 community-based programmes operating in Safe Communities designated by the Canadian Safe Community Foundation.
The study objects of studies F and G are not actual programmes or communities, as these are theoretical studies based on the literature on community-based health and safety programmes and the author’s experiential knowledge and conjecture.

Table 4: Study objects of the seven studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Study objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Effectiveness of Community-Based Injury Prevention 14 Swedish municipalities that are designated WHO Safe Communities and operate community-based injury prevention programmes that fulfill certain criteria.</td>
</tr>
<tr>
<td>C</td>
<td>Towards Improved Understanding of Injury Prevention Program Sustainability Community-based injury prevention programmes operating in 10 Swedish WHO Safe Communities.</td>
</tr>
<tr>
<td>D</td>
<td>Strategies and Goals of Community-Based Injury Prevention Programs Community-based injury prevention programmes operating in 25 Scandinavian WHO Safe Communities.</td>
</tr>
<tr>
<td>E</td>
<td>Using Local Injury Surveillance for Community-Based Injury Prevention Community-based injury prevention programmes operating in 25 Scandinavian WHO Safe Communities and in 16 Canadian communities, which have been designated Safe Communities by the Canadian Safe Community Foundation.</td>
</tr>
<tr>
<td>F</td>
<td>The Theory of Community-Based Health and Safety Programs – A Critical Examination Theoretical study, drawing upon the literature on community-based health and safety programmes.</td>
</tr>
<tr>
<td>G</td>
<td>The How and Why of Community-Based Injury Prevention – A Conceptual and Evaluation Model Theoretical study, drawing upon the literature on theory-based evaluation and community-based health and safety programmes.</td>
</tr>
</tbody>
</table>

5.2. WHO Safe Community

The five empirical studies of the thesis involved community-based injury prevention programmes operating in WHO-designated Safe Communities. The WHO Safe Community concept was developed in Sweden in the mid-1980s, after successful implementation of a community-based injury prevention programme in Falköping (Bjerre &
Jonell, 1998). The concept was formally initiated in 1989 as a model for communities around the world to adopt locally (Rahim, 2005).

There are currently (as of 1 January 2006) 74 WHO-designated Safe Communities operating in 18 countries across the world. Eight communities are scheduled for WHO designation in 2006 and another 61 communities are preparing to seek designation (WHO Collaborating Centre on Community Safety Promotion, 2006b). As a result, the WHO Safe Communities network could almost double from 74 to 143 over the course of this decade, i.e. 93% increase.

Three countries account for 57% of all WHO Safe Communities: Norway (17); Sweden (15); and Australia (10). The remaining 15 countries with WHO designations have between one and five Safe Communities each: Canada (5); Denmark (5); Taiwan (4); China (3); New Zealand (3); USA (2); Austria (2); Finland (1); Estonia (1); the Netherlands (1); Bosnia and Herzegovina (1); the Czech Republic (1); Israel (1); South Korea (1); South Africa (1) (WHO Collaborating Centre on Community Safety Promotion, 2006b).

Communities in several additional host countries have applied for WHO Safe Communities status. Three communities in Vietnam are scheduled for designation in 2006. In all, eight new countries, Bangladesh, Thailand, Brazil, Iran, Japan, Montenegro, Serbia, and Vietnam are expected to apply for WHO Safe Community status in the next few years (WHO Collaborating Centre on Community Safety Promotion, 2006b). If all applicants are successful in obtaining designation, the number of countries involved in the WHO Safe Community network has the potential to increase by over 44%, from 18 to 26 countries over the course of this decade.

Under the Safe Community model, each community arranges local support for its community safety coalition, local interventions, and its involvement in regional, national, and international WHO Safe Community networks. There is no direct WHO funding assistance (WHO Collaborating Centre on Community Safety Promotion,
Designation as a WHO Safe Community is based on local capacity to meet six indicators: (1) an infrastructure based on partnership and collaborations, governed by a cross-sectional group that is responsible for safety promotion in their community; (2) long-term and sustainable programmes, covering both genders and all ages, environments, and situations; (3) programmes that target high-risk groups and environments, and promote safety for vulnerable groups; (4) ongoing documentation of frequency and causes of injuries; (5) regular evaluation to assess the programmes, processes, and the effects of change; (6) and participation of programme staff in national and international Safe Communities networks (WHO Collaborating Centre on Community Safety Promotion, 2006c).

The WHO Collaborating Centre on Community Safety Promotion, located at the Karolinska Institute in Sweden, designates Safe Communities and coordinates information sharing throughout the programme network of the designated local WHO Safe Communities. The Collaborating Centre is responsible for assessing applications to become a designated WHO Safe Community. Ten Affiliate Support Centres in nine countries provide advice and assistance to the communities in their countries and internationally (Rahim, 2005).

The operation of WHO Safe Community programmes in Scandinavia is incorporated into the routine function of a responsible local government (a municipality or a county). The programmes are typically led by a management group that includes local government politicians, health sector personnel, and a programme coordinator. The programme coordinator heads a reference group, which coordinates various intersectoral workgroups, usually consisting of representatives from local organisations, including voluntary organisations, health care organisations, and the trade and industry (Bjärås, 1991; Harjula, 2004).
5.3. Canadian Safe Communities Foundation

Study E involved community-based injury prevention programmes operating in Safe Communities designated by the Canadian Safe Communities Foundation (SCF) network. Initiated in 1996, SCF is a partnership with private and public sector organisations to improve the health and safety throughout Canadian communities (SCF, 1996; SCF, 2006a). The SCF promotes the formation of community-based injury prevention programmes, with the goal of reducing injuries, while promoting a culture of safety across Canada.

There are 48 SCF Safe Communities (as of 1 January 2006), covering approximately 23% of the total Canadian population (SCF, 2006b). Five of the SCF Safe Communities are also designated WHO Safe Communities (WHO Collaborating Centre on Community Safety Promotion, 2006b). The SCF has a further 24 communities currently preparing for designation. Hence, the SCF network could increase by 50%, from 48 to 72, in the near future (Bourne et al., 2006).

The Canadian model requires communities to meet seven criteria for designation, i.e. to: (1) have an organisation with a wide membership drawing from a broad range of health and safety partners, business, community and government at all levels; (2) show strong indicators of community readiness for safety promotion activities, including evidence of injury prevention programmes planned or already underway; (3) be properly constituted with terms of reference and structure in the application; (4) be financially sound; (5) have the support of key community leaders; (6) gain support and involvement of local sponsors; and (7) provide a sound business plan which includes clear, measurable goals and objectives, injury problem targets, timelines and a work plan (SCF, 2006c).

The local programmes are supported by a coordinating centre in Toronto and regional coordinators situated across Canada.
Openining the Black Box of Community-Based Injury Prevention Programmes

(SCF, 2006a; SCF, 2006b). The coordinating centre is also one of the 10 Affiliate Support Centres of the WHO Safe Community network (WHO Collaborating Centre on Community Safety Promotion, 2006a).

In contrast to the WHO Safe Communities, which are self-financed, the SCF network provides communities with materials and technical support to build and maintain programmes and some initial funding for up to two years in some cases. The programmes are operated by intersectoral local coalitions, comprised of representatives from local government agencies and various community organisations, businesses, and service providers, including enforcement and workplace safety agencies. Programme coordinators, if appointed, are usually employed by a local government acting as the overseeing agency (SCF, 2006b).
6. Methodology

This chapter describes the research methodology of the seven studies comprising the thesis. An overview of the research methodology is first presented, then more comprehensive details for different aspects of the methodology are furnished.

6.1. Overview of the research methodology

A research project is built on the foundation of its questions. Different questions require different methodologies to answer them; the methodology follows from the research questions and study aims (Punch, 1998). Research methodology deals with the purpose of generating knowledge (research purpose), the logic of inquiry (research strategy), and the techniques used to collect and analyse data (research method) (Svenning, 1999).

As is shown in table 5 and table 6, this thesis is characterised by considerable methodological diversity. This was considered necessary to address the research questions of this thesis.
Table 5: Overall characteristics of the studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Primary research purpose</th>
<th>Research Strategy</th>
<th>Study characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Effectiveness of Community-Based Injury Prevention Sustainability</td>
<td>Description and explanation.</td>
<td>Induction and deduction.</td>
<td>Registry data study.</td>
</tr>
<tr>
<td>F The Theory of Community-Based Health and Safety Programs – A Critical Examination</td>
<td>Explanation.</td>
<td>Induction and deduction.</td>
<td>Theoretical study.</td>
</tr>
</tbody>
</table>

Table 6: Data characteristics of the studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Data type and source</th>
<th>Primary forms of data</th>
<th>Data collection method</th>
<th>Data analysis method</th>
</tr>
</thead>
<tbody>
<tr>
<td>A What Makes Community-Based Injury Prevention Work?</td>
<td>Secondary data: evaluations of community-based injury prevention programmes.</td>
<td>Quantitative (collection, analysis, reporting) and qualitative (collection, analysis, reporting).</td>
<td>Data obtained from published evaluations of community-based injury prevention programmes.</td>
<td>Description and statistical analysis of injury rates (counts). Categorisation according to assessments of effectiveness (nominal scaling). Actual or potential influences on effectiveness were analysed using coding with labels being assigned to different themes within three conceptual categories (structure, process, and context).</td>
</tr>
</tbody>
</table>

Table continues on next page.
### 6. Methodology

<table>
<thead>
<tr>
<th><strong>B</strong> Effective-ness of Community-Based Injury Prevention</th>
<th><strong>Secondary data:</strong> injury registry data from the Swedish Hospital Patient Register.</th>
<th><strong>Quantitative</strong> (collection, analysis, reporting).</th>
<th><strong>Data obtained from injury registry statistics.</strong></th>
<th><strong>Description of effectiveness (counts). Discussion of potential influences on effectiveness.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C</strong> Towards Improved Understanding of Injury Prevention Program Sustainability</td>
<td><strong>Primary data:</strong> programme coordinators.</td>
<td><strong>Qualitative</strong> (collection, analysis, reporting).</td>
<td><strong>Semi-structured interviews guided by a framework comprised of seven programme elements.</strong></td>
<td><strong>Transcribed interviews were coded, with labels assigned to different themes within seven conceptual categories (four types of resources, context, process, and effects).</strong></td>
</tr>
<tr>
<td><strong>D</strong> Strategies and Goals of Community-Based Injury Prevention Programs</td>
<td><strong>Primary data:</strong> questionnaire for and interviews with programme coordinators.</td>
<td><strong>Quantitative</strong> (collection, analysis, reporting) and qualitative (collection, analysis, reporting).</td>
<td><strong>Questionnaire and subsequent interviews based on the results of the questionnaire.</strong></td>
<td><strong>Description of questionnaire data (mostly ordinal scaling, treated as interval scaling). Transcribed interviews were coded, with labels assigned to different themes within four conceptual categories (the four questions of the questionnaire).</strong></td>
</tr>
<tr>
<td><strong>E</strong> Using Local Injury Surveillance for Community-Based Injury Prevention</td>
<td><strong>Primary data:</strong> questionnaire for programme coordinators, officers, team leaders, and managers.</td>
<td><strong>Quantitative</strong> (collection, analysis, reporting).</td>
<td><strong>Questionnaire.</strong></td>
<td><strong>Description of questionnaire data (mostly ordinal scaling, treated as interval scaling).</strong></td>
</tr>
<tr>
<td><strong>F</strong> The Theory of Community-Based Health and Safety Programs – A Critical Examination</td>
<td>The author’s experiential knowledge and conjecture based on the literature on community-based health and safety programmes</td>
<td><strong>Qualitative</strong> (reporting).</td>
<td>No empirical data were gathered specifically for this theoretical study.</td>
<td>No empirical data were analysed for this theoretical study.</td>
</tr>
<tr>
<td><strong>G</strong> The How and Why of Community-Based Injury Prevention – A Conceptual and Evaluation Model</td>
<td>The author’s experiential knowledge and conjecture based on the literature on theory-based evaluation and community-based health and safety programmes</td>
<td><strong>Qualitative</strong> (reporting).</td>
<td>No empirical data were gathered specifically for this theoretical study.</td>
<td>No empirical data were analysed for this theoretical study.</td>
</tr>
</tbody>
</table>
6.1.1. Research purposes

Research purpose is concerned with the type of knowledge produced. The research question “does it work?”, addressed in studies A and B, is a “what” question that lends itself well to descriptive research. Descriptive research is used when the objective is to provide a systematic description that is as factual and accurate as possible (Sarantakos, 2005).

Descriptive research is concerned with making complicated things understandable, focusing on what is the case. However, descriptive research cannot explain why or how something is the case (Punch, 1998). Hence, the thesis’ “why” and “how” questions may require other types of research. Explanatory research is a continuation of descriptive research, as the researcher goes beyond merely describing the characteristics, to explain and/or understand why or how something is happening (Blaikie, 2003).

In addition to their descriptive purposes, studies A and B had explanatory purposes in that they attempted to clarify why different degrees of programme effectiveness were attained. Studies C, D, and E all had explanatory purposes, attempting to analyse the importance of various factors in order to understand their influence on programme operation and effectiveness. Studies F and G also had explanation as their objectives, as study F sought to build and verify a theory of the community-based approach to health and safety programmes, while study G delineated key programme elements and effects, and the chain of causal assumptions linking these.

While study C had an explanatory purpose, the study can also be characterised as exploratory. This type of research is conducted when a problem is not well known or there are few or no earlier studies to which references can be made for information (Svenning, 1999). No known study has specifically investigated the sustainability of community-based injury prevention programmes or the sustainability of programmes that already are “institutionalised,” being incorporated
into the normal function of a local government, as is the case with the programmes under investigation. In exploratory research, the focus is on gaining insights and familiarity with the subject area for more rigorous investigation later. An exploratory purpose does not preclude an explanatory objective (Sarantakos, 2005).

### 6.1.2. Research strategies

The principal aim in choosing a research strategy is to achieve the best procedure for answering research questions. Different questions may require different strategies (Svenning, 1999). Studies A and B applied an inductive strategy, which is well suited to answer “what” questions. According to this strategy, objective observation and measurement, as well as accurate analysis of data are required to produce scientific discoveries. Inductive logic is used to produce generalisations about the patterns or regularities that exist in the data obtained (Blaikie, 2003). Studies A and B both used existing data in order to answer the question “does it work?”, by examining the effectiveness of community-based programmes.

In addition to induction, studies A and B applied a deductive research strategy to address the question “why does it work?”. A deductive strategy is typically needed to answer “why” questions. In deductive research, it is necessary first to have some tentative answers to the “why” questions posed, to provide direction for the data collection (Blaikie, 2003). Data are used to test the tentative answers, with the aim of seeing if the data matches the tentative idea or conjecture. Hence, in this approach, data are used in the service of reasoning and theories are “invented” to account for the discoveries, not derived from them (as is the case in inductive research). Instead of looking for confirming evidence to support an emerging generalisation, the deductive strategy attempts to refute the tentative theories that have been proposed (Punch, 1998).
Studies C, D, and E all applied a deductive research strategy to provide answers to “why does it work?”. Study C investigated the influence of various factors on the sustainability of programme operation. Studies D and E took a slightly different approach, instead examining a few specific factors that previous research has identified as “success factors” in achieving programme effectiveness.

Previous research has predominantly attempted to explain “why does it work?” (or “what makes it work?”) by attempting to link quantitative data related to programme activities to the effects achieved, i.e. assessing “dose-response” relationships. However, it has generally been difficult to measure the impact of specific components of multifaceted programmes on the effectiveness of the programmes (Guyer et al., 1989; Schwarz et al., 1993; Bjerre & Schelp, 2000). Clearly, measuring dose-response relationships is much easier for simpler interventions comprised of just a few components (Koepsell et al., 1992). Component analysis in programmes with dozens of different components and hundreds of combinations is nearly impossible (Mittelmark et al., 1993).

Explanations are typically produced by researchers who look at a phenomenon from the outside, while understanding is based on an inside perspective in which researchers grasp the interpretations of social actors involved in the conduct (Blaikie, 2003). Instead of focusing on explanation from the outside, by attempting to analyse dose-response relationships or conducting complex component analyses, studies C, D, and E aimed for improved understanding of why programmes attain effectiveness through analysis of insiders’ programme perspectives and expert opinion regarding a number of factors that are usually seen as critically important for successful injury prevention. This expert opinion refers to “the views of professionals who have expertise in a particular form of practice or field of inquiry” (Rychetnik et al., 2004, page 539). People involved in programme operation expressed their views on and knowledge about the importance of formulating programme goals, combining different
injury prevention strategies, using injury surveillance data for developing and evaluating interventions, and attaining programme sustainability for programme operation and effectiveness.

Study F used elements of both induction and deduction. It began with an idea for a theory of the community-based approach to health and safety programmes by contemplating common features among different descriptions of community-based programmes, thus inducing a theory. This theory was checked against further descriptions, using deduction. While research is often described as a dichotomous choice between induction or deduction, any study may in fact combine aspects of either strategy as induction and deduction often get intertwined in the course of research (Punch, 1998).

Study G used a retroductive research strategy to expand upon existing conceptualisations of injury prevention programme elements and effects to better specify the chain of causal assumptions linking these elements and effects for improved explanation and understanding of how and why these programmes work. A retroductive strategy aims to discover underlying mechanisms to explain observed regularities by constructing a model. According to this strategy, empirical studies are a first stage that is followed by theoretical studies, which are concerned with producing an explanation for the regularity established by the empirical studies (Blaikie, 2003).

6.1.3. Study characteristics

The character of the studies comprising the thesis differed substantially. Study A is a systematic review of published evaluations of community-based injury prevention programmes. Study B is a registry-based study. Study C is a multiple-case interview study, based on interviews with representatives for community-based injury prevention programmes. Study D is a mixed-method study, combining a questionnaire for and interviews with representatives for community-based injury prevention programmes. Study E is based on a questionnaire to representatives
for community-based injury prevention programmes. Studies F and G are theoretical studies.

6.1.4. Data characteristics

Both primary and secondary data were used in the studies. Primary data are “new” data generated by the researcher, who is responsible for the design of the study, and the collection, analysis, and reporting of the data. Secondary data are data that have already been collected by someone else (Svenning, 1999). Studies C, D, and E generated primary data by collecting and analysing data from questionnaires for and interviews with coordinators and other representatives from a number of community-based programmes. Secondary data were used in study A, which was based on programme evaluations published in the scientific literature, and study B, which utilised existing injury registry data. Meanwhile, studies F and G are theoretical and did not rely on data collected specifically for the studies. They were built by bringing together and integrating what has been learned about the phenomena under study.

Both quantitative and qualitative forms of data were used in the studies. Quantitative data are data in numerical form, whereas qualitative data are essentially data in the form of words (Blaikie, 2003). Data normally start out as words. In qualitatively oriented research, the original words may be transformed and manipulated into other words, e.g. from lay language to the “technical” language of the researcher. In quantitative research approaches, the initial communication is transformed into numbers immediately or prior to the analysis and data are reported primarily in numerical form (Punch, 1998). Studies A and B collected, analysed, and reported quantitative data (injury rates), but study A also collected, analysed, and reported qualitative data (factors that could have influenced the injury rates). Study C was exclusively qualitative, collecting, analysing, and reporting only qualitative data (interview responses). Study D combined qualitative (interview responses) and quantitative data (questionnaire
replies) in all phases: collection, analysis, and reporting. Much like study B, study E was quantitative from collection to reporting (questionnaire replies). While no data were gathered for the theoretical studies F and G, the reported data were qualitative.

Study A gathered data from published evaluations of community-based injury prevention programmes. The study described programme effectiveness, measured as injury incidence (counts). The programmes in study A were also classified into four categories (nominal scaling) depending on the programme effectiveness and scientific rigour of the evaluations. Furthermore, study A examined three programme elements that may have influenced programme effectiveness. Study B collected injury incidence (counts) data from the Swedish national hospital register.

Studies C, D, and E were based on data from representatives for community-based injury prevention programmes. Whereas study C relied on interviews guided by a framework, studies D and E obtained questionnaire data (primarily ordinal scaling, but treated as interval scaling, as is customary (Lekvall & Wahlbin, 1979)). The questionnaire in study D was followed up with select interviews in order to provide depth to the findings. The interview questions were based on the responses to the four questions of the questionnaire. The theoretical studies F and G utilised the author’s experiential knowledge and conjecture rather than data collected for the studies.

Analysis of the qualitative data in studies B, C, and D was performed using coding with labels being assigned to different themes within conceptual categories: the three programme elements in study B (context, resources/structure, and process); the seven programme elements in study C (context, effects, activities/process, and four types of resources); and the four questions of the questionnaire in study D. (Punch, 1998)
6.2. Study A: What Makes Community-Based Injury Prevention Work?

In study A, 31 published evaluations of 16 community-based injury prevention programmes were systematically reviewed. The evaluations were obtained through systematic literature searches of the speciality injury prevention journals and journals in the domains of health promotion and public health. Relevant textbooks on the subject were also studied. Additionally, the PubMed and SafetyLit databases were searched and abstracts of articles were inspected for contents pertaining to injury prevention evaluations. Another source was the WHO Safe Community website operated by Karolinska Institutet, Stockholm, Sweden, which provides detailed information, including listings of published papers, on all WHO-designated Safe Communities members. Each of the 78 WHO Safe Communities (at the time of the study) was examined with regards to published evaluations.

Programmes were included in this systematic review if they met four criteria. The programmes had to: (1) target a group or groups of individuals in a community and involving community representatives in the goal setting, programme design, and implementation; (2) employ multiple strategies; (3) target multiple injury categories (e.g. different injury types such as burns, falls, and poisoning or different environments like home, traffic, and work); and (4) be evaluated in a peer-reviewed scientific journal.

The data analysis was aimed at elucidating the extent that programme effectiveness (measured as injury rate changes) was associated with aspects of the structure and process of the programme and the context in which the programme operates. The analysis of the gathered data was performed as structured reviews of the literature on each programme. The results section of the published evaluations was studied to assess the effectiveness of the programmes, while the discussion section was examined to analyse methodological
6. Methodology

limitations and determine the trustworthiness of the results. Information about the context, structure, and process of the programmes was based on descriptions found in the methods and results sections of the evaluations.

The discussion section of the published evaluation studies provided the main information for the analysis of how the context, structure, and process may have influenced the programme results. Labels were assigned to different themes, i.e. factors that may have influenced the results, within each conceptual category, i.e. the context, structure, and process. A tentative list of themes for each category was compiled, before being refined into a conclusive listing of the most important themes.

6.3. Study B: Effectiveness of Community-Based Injury Prevention

This study examined the injury rate levels, changes, and trends of 14 Swedish WHO-designated Safe Community municipalities. It was based on time-series of injury rates between 1987 and 2002, the data for which were obtained from the Swedish Hospital Patient Register. Each municipality was compared to its municipality group (excluding the municipality’s injury data), according to the classification by the Swedish Association of Local Authorities of Sweden’s 288 municipalities into nine groups. The classification is based on structural parameters such as population size, commuting patterns, and economic structure (Svenska Kommunförbundet, 2005). This classification scheme offers a convenient method by which to measure one municipality against others of similar size and structure in Sweden.

This study covered injuries leading to a stay in hospital of at least one day. Each person who was included in this study was counted only once per year. The proportion of persons hospitalised for more than
one injury within the same year was estimated to be low and should not have influenced the results. Injuries were classified using Swedish versions of the *International Classification of Diseases, Ninth Revision, ICD-9* (1987-1996) (Swedish National Board of Health and Welfare, 1987) and the *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, ICD-10* (1997 and later) (Swedish National Board of Health and Welfare, 1997). The data were based on patients’ parish registered place of residence, i.e. home municipality, not on the place where the injury occurred. Swedish studies indicate that place of injury to a large extent coincides with home municipality (Ekman *et al.*, 2005). The proportion of missing cases (non-registered injuries) is estimated to be less than 1% (Socialstyrelsen, 2005).

The injury rate was defined as the incidence of patients discharged from hospital per 1,000 population. Injury rates were age standardised by taking the Swedish population in 2002 as the standard population. Injury rates were computed for each of the 14 municipalities designated as Safe Communities and for the five groups of municipalities to which the 14 municipalities belong. In addition, injury rates for Sweden as a whole were noted.

Three types of comparisons were made between each municipality and its corresponding municipality group: level, change, and trend of injury rates. The injury rate level was analysed by comparing the average study period injury rate for each municipality with the average injury rate for the corresponding municipality group during the same time period. The “study period” was defined as the time period during which the municipality’s injury prevention programme has been operational (according to the WHO Safe Community website), with 1987 used as the starting year of programmes that were implemented prior to this year due to unavailability of earlier data.

To measure the injury rate change, i.e. the effects of the injury prevention programme on the injury rates, the difference between the average injury rate for the three years preceding the starting year of
each municipality’s injury prevention programme ("the pre/early programme period") and the average injury rate for the three most recent years, 2000-2002 ("the late programme period") was compared against the corresponding data for its municipality group. The use of three-year averages protected for some of the yearly injury rate variations that can be substantial in small populations (Svanström et al., 1995). Statistical significance for calculations was determined by 95% confidence intervals for all levels and changes in injury rates.

Injury rate trends for the 14 municipalities in relation to their municipality group were estimated using Signal Extraction methods and ARIMA Time Series models corresponding to methods used in SEATS, a computer programme developed by Gomez and Maravall in 1996. Modelling programmes of this type are recommended by EUROSTAT for use within the European Union (SRV, 2004). The trend estimation method was adapted to injury incidence data by Wallgren and Wallgren, Statistics Sweden. The overall trends were analysed by examining the graphic information.

6.4. Study C: Towards Improved Understanding of Injury Prevention Program Sustainability

Study C investigated factors facilitating or hindering the sustainability of community-based injury prevention programmes operating in 10 Swedish WHO-designated Safe Communities. A multiple case study approach was used the study. Case study methods are well suited for exploratory research (Fielding & Fielding, 1986) and holistic, in-depth investigations (Feagin et al., 1991). Case studies allow for the investigation of complex causal links in real-life interventions (Yin, 1994). The cross-case analysis adds confidence to the findings and contributes to a deeper understanding and explanation (Miles & Huberman, 1994).
The 10 programmes were strategically selected from the 14 Swedish WHO Safe Communities to obtain some variation with regard to programme and municipality characteristics. Despite these differences, the programmes share many characteristics, including funding mechanisms and overall programme administration, as well as many contextual variables such as the socio-political environment. Hence, 10 programmes were deemed sufficient to obtain data saturation with regard to identifying factors that influence programme sustainability.

Data were collected by means of semi-structured telephone interviews with a key informant from each programme. The programme coordinator was chosen as the key informant because this person has unique insight into all aspects of the programme. The programme coordinator was required to respond as a representative of his/her programme.

An analytical framework was developed for the study, comprised of seven study elements, which guided the collection and analysis of data: financial resources; human resources; relational resources; structural resources; activities; context; and effects.

An interview guide was used in order to make sure that basically the same information was obtained from the 10 programmes. A multiple-case approach requires some standardisation of instruments so that findings can be considered side-by-side in the course of analysis (Miles & Huberman, 1994). The interview guide contained a list of questions that were posed and explored to obtain relevant information about how the seven study elements of the analytical framework influenced programme sustainability. Each interview lasted between 40 and 90 minutes. The interviews were tape-recorded and transcribed verbatim. The interviewer listened to the tapes and examined the transcriptions.

Analysis of the transcribed interviews began with an open coding. The interviews were read and labels were assigned to different themes, i.e. factors that interviewees believed contributed to or detracted from programme sustainability, within each conceptual category, i.e. the
seven study elements. The transcripts were analysed “horizontally” so that themes within each category were examined across the 10 study cases. A tentative list of themes for each category was initially compiled, before being refined into a conclusive listing of the most relevant themes. This was followed by a re-examination of the transcriptions to look for representative quotations that could illustrate the themes.

### 6.5. Study D: Strategies and Goals of Community-Based Injury Prevention Programs

Study D investigated the injury prevention goals and approaches (strategies and measures) of 25 Scandinavian community-based programmes designated WHO Safe Communities. The study employed a sequential study design with a mixed-method approach. Collection and analysis of quantitative data from an e-mailed four-item questionnaire for programme coordinators at community-based injury prevention programmes operating in WHO-designated Scandinavian Safe Communities was followed by collection and analysis of qualitative data from structured interviews with programme coordinators from eight of the programmes.

Programme coordinators were chosen as key informants because they are typically highly knowledgeable about their programmes. Each programme coordinator was required to answer the questionnaire and interview as a representative of his/her entire programme. The coordinators were selected for representativeness in two criteria: number of years of programme operation and population size of the communities.

There were 31 Scandinavian Safe Community programmes at the time of the study. Of these, 25 responded to the questionnaire (13 Swedish,
9 Norwegian, and 3 Danish), resulting in a response rate of 81%. A dropout analysis did not reveal any notable differences in terms of programme duration, designation year, and community population size between the programmes that participated and those that did not.

Results for the questionnaire items were calculated, using descriptive statistics. The results were then discussed among the four authors of the article, generating a set of questions for the subsequent interviews. The interview questions primarily concerned interpretations of the results. The interviews were tape-recorded and transcribed verbatim. The principal investigator listened to the tapes and examined the transcriptions.

The responses to the four question areas were analysed. Labels were assigned to different themes, i.e. possible interpretations of the results, within each conceptual category, i.e. the four questions. A tentative list of themes for each category was compiled and discussed among the authors, before being refined into a conclusive listing of relevant explanations.

6.6. Study E: Using Local Injury Surveillance for Community-Based Injury Prevention

Study E examined the extent to which local injury data were collected, documented, analysed, linked to injury prevention action, and used for evaluation in WHO-designated Safe Communities in Scandinavia and the Canadian SCF network. A key informant with knowledge about each programme was selected to respond to an e-mailed questionnaire as a representative of their programme. The respondents were typically a programme manager, director, officer, coordinator, or a member of the local programme partnership/coalition.
The questionnaire for the Scandinavian programmes was in Swedish, which is understood throughout the Scandinavian region. The corresponding questionnaire to the Canadian programmes was in English. There were 31 Scandinavian WHO Safe Community programmes and 40 Canadian SCF programmes at the time of the study. The response rates were 81% for the Scandinavian programmes (25 of 31 responded: 13 Swedish, 9 Norwegian, and 3 Danish) and 40% for the Canadian (16 out of the 40 programmes responded).

A dropout analysis did not reveal any noticeable differences in terms of designation year and community population size between the WHO Scandinavian Safe Communities that participated in the study and those that did not. The SCF communities that did not take part in the study were smaller (101,000 average and 62,000 median population size) than those that participated (198,000 average and 64,000 median population size). With regard to designation year, there were only minor differences between the participating and the non-participating Canadian communities.

### 6.7. Study F: The Theory of Community-Based Health and Safety Programs – A Critical Examination

Study F is a theoretical study, building and scrutinising a theory of the community-based approach to health and safety programmes. The study relied on the author’s experiential knowledge and conjecture rather than empirical data collected specifically for the study. Seven principles, representing key assumptions of this approach, were “tested” against empirical evidence with regard to their plausibility and their application in programme practice.

Study G is also a theoretical study, developing a conceptual and evaluation model that identifies four key programme elements and three types of effects. The causal chain of assumptions linking these elements and effects is specified. Like study F, the study utilised the author’s experiential knowledge and conjecture rather than empirical data collected specifically for the study. The study also drew on ideas from theory-based evaluation, an approach to evaluation that has been advocated as an approach to open the black box of complex programmes in order to improve interventions and programmes.
7. Results

In this chapter, the results of the empirical studies of the thesis (studies A to E) are presented in abbreviated form. Readers are reminded that the results of the theoretical studies F and G are incorporated into the theoretical framework, chapter 3, of this thesis. The complete results of all studies can be found in the appended papers in the second part of the thesis.


This study examined evaluations of 16 community-based injury prevention programmes with regard to reported effectiveness (injury rate changes) and factors influencing the effectiveness.

The programmes were classified into four broad categories based on assessments of the effectiveness of the programme and the scientific rigour of the programme evaluation. Four programmes in category A programmes achieved substantial and statistically significant decreases in injury rates, reporting reductions of between 15% and 50% for many of the targeted injury categories. The evaluations of these programmes employed rigorous quasi-experimental designs. The five category B programmes demonstrated more mixed results, while the three programmes in category C evidenced only minor or no degree of effectiveness. Category D was comprised of four programmes that were evaluated without comparison areas. Some of the programmes belonging to category D did demonstrate very positive results, but the
weak evaluation design suggests that caution is warranted when interpreting the findings.

The structure of the programmes was analysed to determine to what extent the duration of individual programmes were related to effectiveness. Most successful programmes were generally longer lasting than the other programmes. Insufficient intervention effort and duration were discussed as important factors explaining a lack of significant success in five of the programme evaluations. The majority of the studies emphasised the importance of injury surveillance systems for the overall outcome of the programmes.

With regard to the process, the majority of the programmes combined elements of passive and active prevention strategies. Active interventions were primarily educational, informational, and incorporated training techniques, while the most frequently used passive intervention was improvement to the environment.

Several aspects of the programmes’ contexts were analysed to identify factors that could influence programme effectiveness. With the exception of one programme, all the programmes defined community in geographical terms. Three categories of communities were identified: (1) small rural towns; (2) medium-sized towns and cities (population 22,000 to 55,000) with modest population density; (3) urbanised regions with high population density. The four most successful programmes were implemented in medium-sized Scandinavian communities. However, aside from this observation, it was not possible to discern an association between intervention area population size and programme effectiveness.

The social and cultural homogeneity of intervention communities was identified in four of the studies as an important influence on programme success. In some cases, when programmes did not factor in community cohesion levels into programme delivery, the programmes suffered. Socio-economical status of the intervention area was another important contextual factor addressed in three studies. However, the
findings on the importance of this factor in programme success were mixed.

7.2. Study B: Effectiveness of the WHO Safe Community Model for Injury Prevention

Study B assessed the effectiveness of community-based injury prevention programmes operating in 14 Swedish municipalities that were WHO-designated Safe Communities. Effectiveness was measured in terms of injury rate levels, changes, and trends between 1987 and 2002. The results for each municipality were compared with those for the municipality group to which it belongs.

The average injury rate levels for the 14 Safe Communities (i.e. municipalities) ranged from 11.54 to 19.09 per 1,000 population during the study period, i.e. the period which a programme has been operational. The majority of municipalities, 11 of 14, had levels below 15 injuries (i.e. hospitalisations) per 1,000 population, while three were in the 15.99 to 19.09 range. The average injury rate level for Sweden as a whole during 1987-2002 was 12.00 injuries per 1,000 population.

Three municipalities, Katrineholm, Ludvika, and Krokom, had lower average study period injury rate levels than their respective municipality groups. Eleven municipalities had higher injury rate levels than the corresponding municipality groups. The largest absolute difference between a municipality and its municipality group average injury rate levels was noted for Motala, which had an 8.68 per 1,000 population higher injury rate than its municipality group during the study period.
Seven of the 14 municipalities demonstrated positive injury rate changes in that they reduced the injury rates from the pre/early programme period (average for the three years preceding programme start) to the late programme period (average for 2000-2002). The largest relative decrease was noted for Lidköping (15.31% decrease in injury rates), followed by Katrineholm (12.72% decrease), and Falköping (8.31% decrease). However, 12 of the 14 comparison municipality groups also noted injury rate reductions during the relevant time periods. The national injury rate change (from the average for 1987-1989 to the average for 2000-2002) for Sweden as a whole was a decrease of 5.14% (decrease of 6.84% from 1987 to 2002).

Five of the 14 municipalities “outperformed” their respective municipality groups, i.e. achieving higher relative injury rate decreases during the study period. The largest absolute net injury rate decrease in relation to their municipality groups was observed for Lidköping (15.31% reduction in comparison to a 5.47% decrease for the municipality group equals a 9.84% net decrease) and Katrineholm (9.82% net decrease). Falköping, Tidaholm, and Nacka also achieved larger relative injury rate reductions during the study period than their respective municipality groups.

Nine municipalities evidenced less favourable changes than their comparison municipality groups between the pre/early and late programme periods. Krokom (28.71% net increase) and Falun (22.89% net increase) demonstrated the least favourable injury rate development in comparison with their respective municipality groups.

The trends for the 14 municipalities in relation to their municipality groups exhibited inconsistent patterns: four municipalities demonstrated overall favourable trends compared with their municipality groups during the study period (Falköping, Lidköping, Uddevalla, Katrineholm); four mirrored the development of their municipality groups, in that the difference in injury rates neither increased nor decreased (Arjeplog, Tidaholm, Nacka, Ludvika); three
experienced predominantly negative trends in relation to the corresponding municipality groups (Krokom, Falun, Borås); and three showcased “rollercoaster”-like trends with injury rates that ended up at levels roughly similar to where they began (Motala, Skövde, Mariestad).

7.3. Study C: Towards Improved Understanding of Injury Prevention Program Sustainability

This study analysed community-based injury prevention programmes operating in 10 Swedish WHO-designated Safe Communities with respect to factors that contribute to or detract from programme sustainability.

The results suggested that several interrelated factors work together in such a way that no one factor is either primary or by itself sufficient for programme sustainability. Financial resources, “translated” into personnel resources and time devoted to the programme, determine the overall ambition level of the programme. The programmes are integrated within existing municipality structures, which make them vulnerable to changes in the financial status of the municipality and the priority-setting by the municipality politicians. Insufficient financial resources may lead to a “poverty circle,” by which reduced programme intensity leads to reduced effectiveness.

Human resources, i.e. individual knowledge, skills, and abilities inherent in the programme personnel, help shape and refine the programme over time. However, sustainability may be compromised if the programme becomes too dependent on a few key individuals.

Relational resources in the form of the programme management’s capability to collaborate with the municipality politicians and
intersectoral collaborators are critically important. Relationships with both politicians and local participants are deemed fundamental to achieving programme sustainability. The involvement of intersectoral collaborators create local “ownership” of the programme and establishes its local legitimacy, while political commitment at the highest municipality levels is required, as strategic programme decisions cannot be made without political support.

An important structural resource for many programmes is injury surveillance systems. Programme coordinators emphasised the importance of injury surveillance for acquiring reliable injury data, in order to assess the programme effects over time. Still, they were very much aware of the limitations of the assembled data, which are often incomplete or based on very few injury cases. They primarily used the data in order to detect changes in trends or digressions from expected patterns. Another strategic structural resource is programme goals. Programme coordinators generally viewed goals as important for their long-term strategic planning, yet few actually formulated measurable goals.

Regarding activities, programme coordinators emphasised the importance of a consistent long-term strategy and a core ideology to injury prevention. However, they also said that variation of delivered activities was a necessary element of programme endurance. They achieved this by implementing shorter-term initiatives that target specific injury categories and by mounting brief one-off campaigns to attract attention for the programme.

The programmes’ context also influences sustainability. Programme coordinators stressed the importance of adapting the programmes to their social and economic context and population demography, in order to achieve continued local relevance. The programmes need to evolve over time in response to the dynamics of the community and changing realities. Programme adaptation was primarily facilitated with assessments of injury data patterns and maintaining a close “connection” to the community via feedback from workgroup
collaborators, field personnel implementing the programme, and members of the general public.

While most programmes described desirable programme effects in terms of injury rate reductions, many programme coordinators viewed programme effects broadly, encompassing factors such as reduced injury risks in the community, increased perceived safety among community residents, and improved local safety culture, i.e. safety-related beliefs, norms, attitudes, and practices. Due to a lack of evaluations of effects, the programmes under study are sustained with no real evidence of effectiveness. Programme coordinators believed that, instead of objective evidence, it is a programme’s general reputation for effectiveness amongst stakeholders such as municipality politicians, workgroup participants, and the general public that is important for programme sustainability.

7.4. Study D: Strategies and Goals of Community-Based Injury Prevention Programs

This study investigated the injury prevention goals and approaches (strategies and measures) of 25 Scandinavian community-based programmes in WHO-designated Safe Communities.

Experiences gained in the injury prevention work were considered the most important factors for selecting interventions to implement. Discussions in WHO Safe Community networks and feedback from members of the public were also important. Generally, more informal and subjective methods (experiences, discussions, and feedback) were considered more important decision criteria than “scientific,” objective data sources. The programme coordinators believed this reflected both the importance of the local programme collaborators in shaping
programme content and a perceived lack of time for analysis and discussion of injury data to allow for “transformation” of the data into plans for action.

The most effective strategies and measures to prevent injuries were modification of the physical environment/products to provide automatic protection, followed by hazard inspections, and provision of information/education to individuals/groups of people. Programme coordinators suggested that passive approaches typically are easier to implement and are generally perceived as being more effective than active interventions in the short run. However, active approaches, providing information and/or education, also received relatively high scores. Interviewees believed this reflected the emphasis placed on implementing efforts initiated by the local programme collaborators.

The six WHO Safe Community programme indicators (see description in chapter 5 of the thesis) were applied as goals by 72% of the programmes. Roughly half of the programmes (48%) used non-quantitative goals, while 32% used quantitative goals. National goals/guidelines were used by 28% of the programmes and 8% reported the use of unofficial/implicit goals. The programme coordinators indicated that the frequent use of non-quantitative goals and the Safe Community indicators were due to several interrelated reasons: the perceived difficulty of formulating specific goals or objectives for the effects of the programmes; a scarcity of documentation of analysed injury data to allow for the development of quantitative goals; and a general preference for defining broader goals over precise objectives among programme personnel (regardless of whether the necessary data exist or not), due to a perceived lack of importance of detailed objectives.

The primary purpose of the goals was to contribute to creating common values and/or a unified culture among the programme personnel. The responses suggested that, in the absence of precise quantitative goals or objectives, the primary function of the goals is
motivational rather than to provide decision guidelines or fulfil evaluative purposes.

7.5. Study E: Using Local Injury Surveillance for Community-Based Injury Prevention

This study examined the extent to which local injury data were collected, documented, analysed, linked to injury prevention action, and used for evaluation by WHO Safe Communities in Scandinavia (25 programmes) and the Canadian Safe Community Foundation (SCF) network (16 programmes).

Local data were currently available to 93% of the Canadian programmes (14 of 15 programmes which responded to this question), while the corresponding figure for Scandinavia was 72% (18 of 25 programmes).

Eighteen of the 25 Scandinavian programmes and nine of the 16 Canadian programmes replied to a question about the frequency of documenting local injury data (in reports, memos, simple data printouts, etc.). The vast majority of the programmes stated that they document local injury data yearly or less frequently. Of the Canadian programmes, 67% (six out of nine) reported assembling the data yearly or less often. The same proportion of Scandinavian programmes that replied to this question (12 out of 18) also stated that they assembled the data yearly or less frequently.

Seventeen of the 25 Scandinavian programmes and eight of the 16 SCF programmes responded to a request for annual estimates of the total time programme personnel devoted to analysing (inspecting, interpreting, discussing, etc.) local injury data. The Scandinavian programmes generally spent less time analysing the data, with 12% of
these programmes reporting that they devote two weeks or more to this, while 57% of the Canadian programmes spent at least two weeks on this data analysis. Roughly half (53%) of the Scandinavian programmes reported spending a few days or less, annually, on data analysis. Similarly, the corresponding figure for the Canadian programmes was 50%.

Overall, Canadian programmes rated the usefulness of the local injury data higher than did the Scandinavian programmes. The primary reasons Scandinavian programmes collected local injury surveillance data were to provide an overall picture of the injury situation and to monitor/study trends over time. Canadian programmes said that the most important uses for the data were to identify different types of risk categories, to provide an overall picture of the injury situation, and to provide a basis for decision-making concerning which interventions to undertake.

The Scandinavian programmes reported that experiences gained in their injury prevention work were most influential for selecting interventions (this question was the same as in study D). The ratings were generally higher for more informal and subjective methods (experiences, discussions, and feedback) than for “scientific,” objective data sources (injury data and statistics). The Canadian programmes also reported the highest mean response scores for experiences gained in their injury prevention work, but the SCF programmes generally attributed more importance to locally collected injury data than did the Scandinavian programmes.
8. Discussion

The seven studies of this thesis have addressed three research questions, “does it work?”, “why does it work?”, and “how does it work?”, in order to contribute to improved understanding of the community-based approach to injury prevention. In the following, the main findings from the studies pertaining to the three questions are discussed. The effectiveness of the WHO Safe Community model for community-based injury prevention, as it has been applied in Sweden, is also discussed. Methodological considerations of the studies are addressed and future areas for research are outlined.

8.1. “Does it work?”

Studies A and B addressed the research question “does it work?” by examining the effectiveness of a number of community-based programmes. Study A was a systematic review of 16 evaluated programmes, while study B evaluated the effectiveness of programmes operating in the 14 Swedish municipalities designated WHO Safe Communities.

Study A sought an overall assessment of programme effectiveness, measured as injury rate changes for injuries at three severity levels (deaths, hospitalisations, and non-hospitalisations). The assessment also accounted for the scientific rigour of the evaluation. In contrast, study B analysed only injuries leading to hospitalisation, examining the injury rate levels, changes, and trends between 1987 and 2002 for each municipality in relation to the municipality group to which it belongs. Combining elements of quasi-experimental and time-series designs, study B is probably the most comprehensive evaluation yet of
community-based injury prevention programmes, both in terms of the number of programmes under study and the time periods for which injury rates were noted.

The overall effectiveness of the 16 programmes in study A varied considerably, from programmes that achieved little or no measurable effects, to programmes that were associated with dramatic injury rate reductions. Three of the programmes that were amongst those identified in study A as having attained the highest degree of effectiveness were also part of study B’s research group. However, study B suggested that only one of these programmes had been able to sustain the beneficial results of the early programme period evaluated in study A.

In study B, only five of the 14 municipalities attained larger injury rate reductions than their corresponding municipality groups and few of the municipalities displayed consistently better injury rate-reducing trends than their municipality groups. However, as in study A, the results from study B were inconsistent, as the municipalities exhibited a remarkable variety of effects.

All but three municipalities in study B demonstrated higher average injury rate levels than their corresponding municipality groups. One plausible explanation is that municipalities with higher-than-average injury rates are those most likely to initiate injury prevention activities and seek designation as WHO Safe Communities. It is also possible that some of the differences between municipalities and their municipality groups can be explained by considerable intra-group variations within some of the municipality groups. This would make it difficult to compare injury rate levels since individual municipalities may differ substantially even in the same group.

The results of study A indicate that community-based programmes may achieve substantial reductions in the incidence of specific injury categories, e.g. fall-fractures among the elderly, skiing injuries, and school injuries. This finding was also evident from the “meta-
systematic” review found in chapter 3 of this thesis, which concluded that programmes focusing on specific injury types and/or age groups were most successful. Targeting specific injury risk categories may be part of a combined high-risk/population-based approach to community-based injury prevention. However, considering that this approach has a population-level outcome as the primary goal, it is questionable whether the effectiveness of narrowly focused efforts should be measured only in terms of reduction of the incidence of specific injury categories. Community-based programmes that attain large injury rate reductions for certain categories may achieve modest or no improvements in overall injury rates if the targeted categories account for a small proportion of the injuries occurring in the community.

The combined findings from studies A and B indicate that the programmes achieved greater reductions for non-hospitalised injuries. While the reduction of minor injuries is an important aspect of community-based programmes, it can be argued that the reduction of serious injuries should be the primary goal of such programmes, since major injuries are associated with substantially higher cost and reduced functional capacity, impairment, disability, quality of life, and survival in victims (Cryer et al., 1999).

Studies A and B both defined programme success narrowly, in terms of injuries, and many programmes may achieve other important results not analysed in these studies. While reduced injury incidence is widely considered “hard evidence” of injury prevention effectiveness (Smart, 1999), many researchers have called for broader measures of injury prevention programme success. For example, while acknowledging that injury incidence is an important effect variable, Christoffel and Gallagher (1999, page 320) stress that success should “not be defined solely by injury rates.” Klassen et al. (2000) believe that there is a range of outcomes and benefits other than injury frequency that could attest to success in injury promotion. Study C revealed that there is an awareness also among injury prevention programme practitioners that injuries do not constitute the only effect variable of interest.
The conceptual model developed in study G describes attitudinal effects, injury risk effects, and subjective risk/safety effects. While attitudinal modification is rarely the primary or only effect a programme intends to generate, this effect should not be overlooked in evaluations. Active strategies aim to change attitudes, so these effects can and should be evaluated, when possible (Rossi et al., 2004). Still, evaluations clearly should not be restricted to analysis of attitudes since research in many fields shows that the association between attitudinal and behavioural change tends to be weak (Ajzen & Fishbein, 1977; Ajzen, 1988; Lund & Aarø, 2004).

Injury risk reductions are necessary in order to achieve long-range goals (Benson, 1995; Rychetnik et al., 2004). It is desirable to incorporate injury risk assessment into the programme evaluation even when the intended effect to be measured is injury occurrence. This is because the internal validity of the evaluation, i.e. the assurance that the results obtained from an evaluation can be attributed to the programme being evaluated, can be improved if the ultimate effect of main interest is supported by measurement of changes in other effects (Langley & Alsop, 1996; Weiss, 1998). Injury risk assessment may also be required if the incidence of injuries is too small to allow for reliable measurement (Lund & Aarø, 2004). Serious injuries may be too infrequent in smaller communities, with a result that there is not a sufficiently large number to demonstrate injury rate changes through usual statistical tests (Shannon et al., 1999).

The use of injury incidence as the primary or sole outcome measure implicitly means that safety is understood as “non-injuries,” i.e. only the objective dimension of safety is accounted for. A lack of understanding of the complex interplay between objective and subjective safety, as seen with risk compensation effects, contributes to the often unrealistic expectations for injury rate reductions of prevention efforts (Evans, 1991; Hedlund, 2000). Despite the obvious importance of subjective safety, most community-based safety-enhancing initiatives, including those labelled “safety promotion” programmes, appear to be designed and implemented with the chief
objective of reducing injury rates; injury incidence is seen as the primary focus of programme interest and success is overwhelmingly defined as a reduction in injuries (Svanström, 2000; Pless & Hagel 2005).

The emphasis on injury rate-oriented programme evaluation research is due to several factors. The increasing recognition of the importance of evidence-based practice within the wider public health arena (Coombes, 2004; Tones & Green, 2004) and greater accountability in the use of resources within the health sector worldwide add to pressure to demonstrate effectiveness (Nutbeam, 1999). The growing need to prove value-for-money has meant that funders tend to favour evaluation research that focuses on measuring effectiveness in quantitative terms (Smart, 1999). Another reason may be the fact that several community-based injury prevention programmes have been evaluated by key programme stakeholders, which likely has led to more attention being paid to whether a programme works than to questions of why or how it works. Still another likely reason is that evaluation of most non-injury effects, i.e. attitudinal, injury risk, and subjective safety effects, requires data gathering from programme recipients, i.e. the community population, which may be more demanding than to collect and analyse injury registry data. Clearly, it is more convenient to use injury registry data to evaluate effectiveness than to conduct community surveys.

A consequence of applying a broader perspective on what constitutes safety programme success is that programmes would be assessed differently; a programme that failed to reduce injury rates, but achieved a higher level of subjective safety in the community could still be regarded as successful if a yardstick other than injury rates is employed. It has been argued that the most compelling evidence of effectiveness comes from evaluation studies that use a diverse range of data sources and methods. This will provide more relevant and sensitive evidence of the effects of multifaceted programmes and a stronger base for planning programmes in different settings (Nutbeam, 1999; Rada et al., 1999; Potvin & Richard, 2001).
8.2. “Why and how does it work?”

All the studies addressed aspects of the question “why does it work?”, or equally important, “why does it fail?”. Study A analysed factors that may have influenced the effectiveness of programmes, thus being one of the few systematic reviews of community-based injury prevention programmes that not merely reported on effectiveness but also attempted to explain the “why” of the effects. Study B also analysed the potential influence of various factors on programme effectiveness although this was not an explicit aim of the study. Study C was based on the premise that programme sustainability is a necessary condition for programme effectiveness and the study analysed factors that contribute to or detract from long-term programme operation. Studies D and E tested the relevance of a few specific programme components described in the literature as “success factors” for effectiveness.

Study F examined the application and plausibility of the assumptions of the community-based approach to health and safety programmes, assessing the extent to which a lack of programme effectiveness may be due to failure of implementation, which happens when programmes do not activate the causal mechanisms necessary to achieve the intended effects, or failure of theory, which occurs when programmes set the presumed causal process in motion but this process does not cause the desired results due to shortcomings in the underlying theory (Weiss, 1998).

This discussion of why and how community-based programmes work is structured around the conceptual model of study G, which describes how community-based injury prevention programmes work by clarifying the causal programme mechanisms. This model also allows for pursuit of the “why” of programme success or failure as the sequence of causal assumptions can be tracked to investigate whether the assumed linkages in fact occurred. Applying the conceptual model of study G, the discussion that follows here addresses the extent to which the programme resources, delivery of programme components,
exposure to programme components, and the programme context, may influence programme effectiveness.

### 8.2.1. Financial resources

The conceptual model in study G assumes a causal chain, whereby resources determine the quantity and quality of the delivered programme components, which in turn influence the level of the community population’s exposure to these components. Studies A, B, and C analysed how financial resources impact on programme operation and effectiveness. Study F analysed whether the principles of “substantial resource requirements” and “long-term programme view” are plausible and the extent to which they are applied in community-based injury prevention practice.

Study C demonstrated the importance of securing sufficient financial resources in achieving programme sustainability. The study indicates that there is a risk for periods of very low levels of programme intensity since operation of these “local government-integrated” programmes is inherently vulnerable to changes in the financial status of the municipality and the priority-setting by the municipality politicians. Thus, the programmes may indeed be sustained and survive in the long run, but there is an obvious risk that the effects will be limited since these effects are correlated to both duration and intensity of resource investment and activity of the programme. It is not unlikely that there exists some sort of threshold for community-based programmes, as substantial resources are required to enable certain programme delivery and exposure levels to be exceeded before favourable effects can be achieved.

The findings in study A support the conclusion that a certain degree of duration can be seen as a necessary condition to ensure a successful programme. However, duration is not the sole element that ensures programme success. Study B failed to reveal a consistent association between programme duration and effectiveness. Neither study A nor
study B reported on the resource investments in the programmes under study.

Study F examined the assumptions of the community-based approach to health and safety programmes. The study found considerable empirical evidence of the importance of substantial resource requirements and of taking a long-term view of operation to attain programme effectiveness. Insufficient programme duration has been identified as an important factor that explains the lack of significant effectiveness of many community-based health and safety programmes (Moller, 1992; Feinleib, 1996; O’Loughlin et al., 1998, Christoffel & Gallagher, 1999; Nutbeam, 1999; Ader et al., 2001, Doll et al. 2003; Merzel & D’Afflitti, 2003; Hoffmeister & Mensink, 2004).

While programme duration is usually noted in evaluations of injury prevention efforts, there is often a paucity of information on the resources that were required to achieve certain effects (Klassen et al., 2000; Towner & Dowswell, 2002; Spinks et al., 2004; Lund & Aarø, 2004; Nilsen, 2005). This makes it difficult to determine more precisely the extent to which insufficient resources has been a barrier to successful community-based injury prevention. Very few cost-effectiveness studies of community-based injury prevention programmes have been conducted (Lindqvist, 2002).

### 8.2.2. Intangible resources

While traditional financial and physical assets like buildings and equipment are vital to most organisations, study G also highlights the importance of intangible programme resources such as networks, leadership skills, culture, and knowledge for the operation and effectiveness of community-based injury prevention programmes. Studies C, D, and E involved analysis of the importance of various types of intangible resources for programme sustainability and effectiveness. Study F scrutinised the plausibility and application of the principles of “community member participation” and “intersectoral
collaboration,” which are intangible resources that influence the community’s capacity to mobilise to address safety issues and thus potentially impacting on programme effectiveness.

Sustainability in Swedish WHO Safe Community programmes depends on many human and relational resources, including leadership skills, knowledge-sharing by intersectoral collaborators, and collaborative, trusting relationships with political decision makers and intersectoral collaborators. Other studies have also identified skilled leadership as a variable positively related to programme endurance (e.g. Bjärås, 1991; Backe, 2003). Similarly, the literature overwhelmingly shows a positive relationship between different forms of community participation and programme sustainability (e.g. Rifkin, 1986; Bracht & Kingsbury, 1990; Flynn, 1995; Rosén & Jansson, 2000). An interesting point emerging from the sustainability study was the importance of avoiding the dependence on key persons. This is an aspect that has received little attention in relation to health and safety programme sustainability. The programme coordinator clearly holds a key position of Swedish WHO Safe Communities, with the primary responsibility for driving the programme forwards, coordinating the prevention activities, and maintaining the partnerships with politicians and intersectoral workgroup collaborators.

While empirical evidence supports the association between community participation and programme sustainability, little research has been conducted to examine the extent to which community member participation and intersectoral collaboration actually affect programme effectiveness (O’Neill et al., 1997; Berkowitz, 2001; Granner & Sharpe, 2004). The findings thus far offer “only marginal evidence” that community involvement yields health status changes (Kreuter et al., 2000, page 49) and the results are “insufficient to make strong conclusions about the effects of partnerships on population-level outcomes” (Roussos & Fawcett, 2000, page 375).

In comparison to the importance of financial, human, and relational resources, studies C, D, and E found evidence that structural resources
of many community-based injury prevention programmes are underutilised. Structural resources are supportive capabilities, such as technologies, methodologies, and goals that enable the organisation and its personnel to function (Roos et al., 1997). Poor utilisation of structural resources results in limited accumulation of organisational competence and programme knowledge, which may impact negatively on programme effectiveness.

Study C showed that Swedish WHO Safe Community programmes are sustained without evaluations, i.e. with no real evidence of effectiveness (regardless of how it is measured). Programme coordinators believed that, instead of objective evidence, a programme’s reputation for effectiveness amongst stakeholders is more important for programme sustainability than actually demonstrating effectiveness. Study D showed that few Scandinavian Safe Community programmes formulate measurable goals against which performance can be assessed. The programmes prefer to rely on broadly stated goals rather than specific objectives. These results are consistent with studies that have found that health programme goals tend to be blurred or even non-existent (Springett, 1995). Furthermore, studies D and E also provided evidence that the programmes largely fail to effectively translate collected injury data into relevant knowledge for programme improvement due to insufficient time and personnel resources devoted to analysis and interpretation of data.

In practice, intangible programme resources are rarely considered in evaluations of community-based injury prevention programmes (Nilsen, 2005). However, there is a growing body of research concerning the measurement of intangible community resources and (partially overlapping) concepts such as community capacity, community empowerment, community participation, community competence, and community readiness (Goodman et al., 1996; Goodman et al., 1998; Baker & Teaser-Polk, 1998; Hancock, 2000; Crisp et al., 2000; Petersen, 2002; Granner & Sharpe, 2004). Many knowledge-intensive organisations today use metrics for their intangible resources. These forms of resources have far more
importance than traditional physical or financial resources for organisations which gain competitive advantage from the human, relational, and structural resources (Alvesson, 2001; Purvis et al., 2001; Swart & Kinnie, 2003). It is likely that systematic evaluation approaches will evolve with the increasing recognition of the profound significance of intangible resources (Doll et al., 2003; Granner & Sharpe, 2004).

8.2.3. Delivery of and exposure to programme components

The conceptual model in study G demonstrates the importance of analysing both dimensions of the process of community-based injury prevention programmes, i.e. the quantity and quality of the “delivered dose” of programme components and the level of the community population’s exposure to the programme, i.e. “received dose.” Studies A and D analysed the relative importance of passive and active interventions. Study F involved analysis of the degree to which the principles of “multifaceted interventions” and “population outcome” are plausible and applied in community-based injury prevention practice.

The systematic review of 16 programmes in study A yielded inconsistent evidence as to the actual or perceived effectiveness of active and passive approaches to injury prevention. Three of the four most successful programmes emphasised passive interventions, but the fourth programme in this top category relied almost exclusively on active interventions. However, study D revealed that Scandinavian programme coordinators generally perceived passive injury prevention approaches to be more effective than active approaches. It has increasingly been recognised that the prevention of injuries is most easily accomplished through these passive strategies (Ytterstad, 2003; Stevenson et al., 2004). However, the results of study D also demonstrated the importance of not relying solely on passive approaches, but rather combining these with active interventions such
as education and information. This finding is very much in accordance with the basic premises of the community-based injury prevention model (Barss et al., 1998; Christoffel & Gallagher, 1999).

While providing evidence of the need to combine different injury prevention approaches, the findings of study D also imply that the passive versus active intervention “debate” is rather more complex than commonly believed. Programme representatives suggested that active approaches might be more effective than passive approaches in the long run, since they produce changes in beliefs, norms, attitudes, and practices necessary for long-time improvements in the overall safety culture of the community. It seems reasonable that the “embedded” programme model of the Scandinavian WHO Safe Communities facilitates long-term programme operation to a higher degree than the externally funded programme models most often found outside the Scandinavian area. This embedment contributes to a greater emphasis on active interventions that yield effects that manifest themselves over a longer time frame. Hence, the widely acknowledged supremacy of passive approaches may depend on the time perspective and funding mechanisms that support various community-based programmes.

Community-based programme theory emphasises the importance of multifaceted interventions. An important underlying assumption of these ecologically oriented programmes is the existence of synergistic effects (Mittelmark et al., 1993). However, whether one type of intervention actually enhances the effectiveness of the others remains empirically an open question (Koepsell et al., 1992). To study synergistic effects, many combinations of components would have to be tested against each other. Component analysis in programmes with just a few components is difficult and expensive at best; in programmes with dozens of components and hundreds of combinations, component analysis is nearly impossible (Mittelmark et al., 1993). Still, while there is considerable evidence that multifaceted programmes are indeed more effective than narrowly focused efforts (Simons-Morton et al., 1988; Moller, 1991; Elder et al., 1993; Peek-Asa et al., 2004; Hanson et al.,
empirical findings suggest that there is a wide variation in the degree to which community-based health and safety programmes actually apply an ecological perspective (Merzel & D’Afflitti, 2003; Richard et al., 1996). Single-setting or single-strategy programmes outnumber multifaceted programmes, as practitioners still prefer to target intrapersonal determinants of health rather than unhealthy aspects of people’s environments (Richard et al., 1996).

Another cornerstone of the community-based approach to health and safety programmes is the population outcome goal. This is achieved by directing many interventions towards the general population in the community rather than to high-risk individuals. In practice, however, many programmes combine elements of population-based and high-risk strategies in order to more effectively reach community subgroups (Mittelmark et al., 1993; Merzel & D’Afflitti, 2003; Hoffmeister & Mensink, 2004). Many programmes target specific injury categories with a great deal of success without necessarily achieving a favourable population-level outcome (Klassen et al., 2000; Nixon et al., 2004; Spinks et al., 2005b).

Process evaluations of community-based injury prevention programmes tend to be limited to brief descriptions or lists of the activities undertaken in the programme (Nilsen, 2005). The low status of process evaluation in health promotion and injury prevention has been lamented by many researchers, although research on process evaluation and fidelity of implementation has grown considerably since the late 1990s (Ader et al., 2001; Dusenbury et al., 2003).

### 8.2.4. Context and interaction between programme elements

The context is the wider social, cultural, physical, political, legal, and economic environment within which an injury prevention programme occurs. Study C explored aspects of how the community context influences programme sustainability, while actual and potential
contextual influences on effectiveness were addressed in studies A and B. Study F examined the plausibility of the “community focus” principle of community-based health and safety programmes and the application of this principle in programme practice.

The systematic review of community-based injury prevention programmes in study A highlighted the importance of the community conditions of the programmes. Its findings confirmed that socio-economical status and socio-cultural homogeneity of the community are important factors that may have profound impact on the effectiveness of the programmes. Study A found that some of the most successful programmes of the review were implemented in affluent and reasonably cohesive communities. Similarly, socio-economic community characteristics were offered as one plausible explanation for the disparate injury rate levels seen in study B, as socio-economic status is a well-known, strong risk factor for injury (Cubbin et al., 2000; Faelkner et al., 2000; Stokes et al., 2002).

The context of community-based injury prevention programmes may influence any or all the steps of the pathway from a programme’s resources to its safety effects. Study A supports the notion that certain programme elements may work in one context, but not in another environment or at another point in time. It has been shown that the application of an effective strategy, at an inappropriate stage of community readiness, can delay or disable an entire project (Goodman & Steckler, 1997). It has even been suggested that community-based programmes implemented under less than ideal conditions have produced fairly negative results (Laflamme, 1999). One reason for the modest impact of many community-based health promotion programmes has been an underestimation of the complexity of community dynamics (Feinleib, 1996; Merzel & D’Afflitti, 2003).

The community-based approach to health and safety programmes is grounded in the premise that the community is both the source of the health/safety problems and the means by which solutions are effected. The “community focus” principle assumes that the community is
characterised by members who have a sense of community. Hence, a population may be called a community to the extent that its members have a sense of identification and emotional connection to other members of the community. This implies that communities are primarily relational entities rather than geographically defined localities; what brings people together are common interests and shared values and norms around which social relationships develop (Heller, 1989; Israel et al., 1998; Goodman et al., 1998). However, community-based health and safety programmes overwhelmingly define community as a geographical unit (Elder et al., 1993). All but one programme in study A defined the community in geographical terms and all 74 currently WHO-designated Safe Communities operate in geographical or geopolitical units, i.e. towns, cities, municipalities or counties (WHO Collaborating Centre for Community Safety Promotion, 2006b).

Geographically defined communities may be larger and far more diverse and heterogeneous than relationally defined communities. Research shows that community heterogeneity (e.g. in terms of ethnicity, religion, income, educational and work experience) reduces civic engagement and participation, for example measured by how people allocate their time, money, voting, and willingness to take risks to help others (Costa & Kahn, 2002). Community mobilisation to solve health and safety problems is more likely to occur if a community sees itself as a community (Moller, 1992; Israel et al., 1998). People with a strong sense of community more easily organise themselves because a common identity and a shared fate are important bases for initial group formation (Heller, 1989). A weak sense of community resulting in limited community mobilisation has been identified as an important reason for modest results in some community-based injury prevention programmes (Jeffs et al., 1993; Ozanne-Smith et al., 2002). Study C identified one programme operating in a suburban environment, with a large number of commuters, which contributed to a limited sense of community and a modest degree of community member involvement in the programme.
Geographical communities include people whose primary identity is based on many different factors, e.g. culture, interest, social class, ethnicity, gender or sexual orientation (Rifkin, 1986). This implies that defining the health/safety problem and finding solutions that have community-wide relevance and effects will be more difficult in geographically defined localities, as the risks and various population characteristics may vary considerably within community groups (Spinks et al., 2005a). Study A suggested that community-level injury data may not always capture the nuances of the injury panorama of heterogeneous communities, potentially reducing the effectiveness of interventions attempting to simultaneously affect as many individuals as possible. Many community-based health promotion programmes lack tailored interventions to reach different segments of the communities. Indeed, insufficient population-wide exposure to programme components has been identified as a key reason for the lack of sustained behaviour change of many community-based health promotion programmes of the last 20 years (Feinleib, 1996).

The degree of interconnectedness among the individuals is likely to be higher in smaller communities. This is a key reason why some researchers have proposed that between 6,000 and 20,000 people are the appropriate catchment areas for community-based programmes (Cart Project Team, 1997). Despite this, many community-based programmes have been implemented in very large communities. For instance, the average population size of a WHO-designated Safe Community is 170,000 (Bourne et al., 2006). The WHO Safe Communities vary greatly in size, from the small town of Os, Norway, with 2,150 inhabitants, to the large city of Dallas, USA, with 2 million people (WHO Collaborating Centre on Community Safety Promotion, 2006b). The sense of community cannot be expected to be as strong in some of the larger areas as it would be in smaller ones, where people are likely to interact frequently with each other. It is highly questionable whether programmes in large cities or areas can live up to the bottom-up “ideal” of the community member participation principle.
Provision of community and contextual data is a much overlooked aspect of evaluations of community-based injury prevention programmes. This unfortunately makes it difficult to project the results to other programme efforts in similar or contrasting contexts (Cole, 1999; Dzewaltowski et al., 2004; Nilsen, 2005). Still, the importance of community characteristics and the wider context of interventions has been increasingly recognised in evaluation research (Weiss, 1998; Hawe et al., 2004). For example, Pawson and Tilley’s “realistic evaluation” proposes that “outcome = mechanism + context” (Pawson & Tilley, 1997) and Linnan and Steckler’s approach to process evaluation incorporates the context as an essential process component (Linnan & Steckler, 2002). Still, in the field of injury prevention, the amount of research concerned with interaction between contextual and other factors is negligible (Laflamme, 1999).

8.3. The WHO Safe Community model for community-based injury prevention as applied in Sweden – why doesn’t it work better?

The empirical studies of this thesis concerned community-based injury prevention programmes operating in WHO-designated municipalities in Sweden. While study A of 16 programmes from eight countries indicated that Swedish programmes were amongst those which have achieved the greatest levels of injury prevention success, the evaluation in study B revealed that few municipalities with WHO Safe Community programmes had in fact “outperformed” other municipalities without such designations (or the whole of Sweden) during the 1987-2002 period. The difficulties of attaining high degrees of effectiveness for the Swedish programmes can be analysed by using the conceptual model of study G to track the causal linkages
“backwards” from effects to examine whether the required conditions were in place for the desired effects.

Modest effects can be attributed to insufficient exposure to programme components, which in turn can be explained by insufficient quantity and/or quality of the delivered components. Quality deficiencies may arise because of the overall intuitive and subjective rather than analytic approach to injury prevention exhibited by Scandinavian WHO Safe Community programmes, which results in limited accumulation of programme knowledge.

Studies D and E demonstrated that Scandinavian programmes largely rely on “experience-based” decision making when selecting interventions to implement. Study E, which compared WHO Safe Community programmes with Canadian programmes belonging to the Safe Community Foundation network, suggested that the Canadian programmes in fact approach injury prevention somewhat more scientifically than Scandinavian WHO Safe Community programmes. Canadian programmes make greater use of injury surveillance for assessment, integration into prevention strategies and measures, and evaluation purposes. Study C identified resource constraints with regard to time, personnel, and knowledge (financial and human resource limitations) as the main reason for the paucity of evaluations and the limited use of injury surveillance data (poor utilisation of structural resources).

To some extent, the Swedish programmes exhibit a paradox. The relatively reliable financing facilitates programme sustainability and increases the chances of achieving lasting effects. However, the lack of analysis of injury surveillance data means that there is no data to link to action. Many of the programmes also do not conduct evaluations. Both factors imply that the programmes fail to reach their full potential. Thus, while the Swedish approach appears to be beneficial for programme sustainability, it is quite possible that the long-term effects of these programmes will be far from optimal, due to limited
feedback on programme effects or potential improvements that these programmes could make.

The other dimension of programme delivery is the quantity of implemented interventions, i.e. the overall intensity of the programme. Study C identified key reasons for insufficient scope and range of programme delivery. These include inordinate dependency on key programme individuals (vulnerable human resources) and on the priority-setting by local municipality politicians (vulnerable relational resources). When programme operation is incorporated into the routine functions of responsible municipalities, the intensity may be affected by the overall economic climate of the municipality. Thus, while the Swedish WHO Safe Community programmes may appear to enjoy a very reliable, long-term financial status, the programmes’ intensity is actually quite vulnerable.

Considering the resource constrains affecting most local community-based injury prevention programmes, WHO Safe Community programmes would benefit greatly from additional support from the coordinating and affiliate support centres of the network. Programme evaluation would be more feasible with this support from the coordinating centres, possibly in conjunction with injury prevention researchers. Very few programmes belonging to the WHO Safe Community and other networks such as the Canadian Safe Community Foundation and Safe Kids Worldwide have been systematically evaluated to demonstrate programme effectiveness. Methodological difficulties associated with the evaluation of comprehensive community-based multi-strategy programmes are well known (e.g. Cart Team, 1996; Sim & Mackie, 2001; Hodge, 2002; Nilsen, 2005) and it is unreasonable to expect less resource-intensive programmes to be able to conduct detailed evaluations.

How might such support work? Either the local programmes or the administrative centres could collect injury surveillance data. The centres could provide analysis and interpretation of data, with involvement of collaborating injury prevention researchers. Such
arrangements would increase both the use and effectiveness of injury data, through enhanced transformation of local data into critical programme knowledge. Systematic evaluation efforts would also create the necessary feedback loop that continuously promotes programme improvements. This issue was recognised by the national community-based injury prevention network in New Zealand, Safe Community Foundation New Zealand (SCFNZ), which from its onset has provided comprehensive injury data reports to communities seeking accreditation (SCFNZ, 2005). Hence, SCFNZ has acted in accordance with recent findings indicating that WHO Safe Community programmes primarily request advice, research, and best practice support from the coordinating centres (Nygaard, 2005).

Another issue that should be addressed is the use of WHO Safe Communities indicators as programme drivers. Study B implied that these indicators appear to be too generic and undemanding to ascertain a community’s potential to adequately address injury problems. Moreover, studies C, D, and E demonstrated that compliance to the criteria is inadequate, as few Scandinavian WHO Safe Communities have “ongoing documentation of frequency and causes of injuries” (indicator #4) or conduct “regular evaluation to assess the programmes, processes, and the effects of change” (indicator #5). The fact that the Safe Communities network has recently changed from a 10-year to a five-year re-designation period (WHO Collaborating Centre on Community Safety Promotion, 2006d) indicates an awareness of the need for stricter quality control of the programmes.

Stricter criteria and enforcement of better compliance to these criteria would be desirable to ascertain that WHO-designated Safe Communities actually are more likely candidates for attaining injury prevention success than those without such designations. Certainly, if a large number of WHO Safe Community programmes perform less effectively than those operating in non-designated communities, the relevance of seeking designation can be called into question. It would be preferable if the designation criteria did help identify the ability of communities that are prepared to work at full intensity and those that
cannot. Considering the apparent vulnerability of many Safe Community programmes, an agreement about some sort of earmarking of financial resources for safety activities for a number of years would possibly be a way to guarantee a certain level of programme intensity and not merely programme survival. This promise of ongoing financial support may not be feasible for many applicant communities, but this winnowing of applicants may be preferable than allowing ineffective programmes to continue. Communities that can actually attain and sustain high levels of effectiveness would provide important bench-marking functions and disseminate knowledge of best practices in community-based injury prevention. Modification of the criteria and improved compliance to programme standards may be crucial steps in order to protect the long-term legitimacy and “trademark” of the whole WHO Safe Community network.

The WHO Safe Community network has achieved rapid growth in its relatively short existence. Since the WHO network began in 1989, 96 localities have been designated as WHO Safe Communities, with most designations occurring after 1998. Eight communities have not retained Safe Community status (and 14 communities have merged to make up larger entities). With so many designated Safe Communities, it is inevitable that there will be some fallout. However, the recent change to a five-year re-designation period increases the risk for an even higher number of communities that will not re-designate. While these “drop-outs” have been overshadowed by the influx of new communities seeking designation, there is clearly a delicate balance between the quantity and quality of “accreditation networks” such as the WHO’s Safe Community movement. These networks exhibit a sort of catch-22 dilemma: their relevance partially depends on their magnitude and growth, yet expansion may occur at the expense of quality, which may undermine their continued relevance.

In summary, it is evident that resource constraints form a key reason for the lack of substantial effects of many Swedish WHO Safe Community programmes (as is the case for most community-based injury prevention programmes). While no studies in this thesis
explicitly examined the amount of resources available for the programmes, it is clear that achieving significant and sustainable community-wide effects requires substantial resource investments. The ability to raise and utilise such resources may not be realistic for all programmes.

However, even if most community-based programmes would benefit from larger resource investments, the extent to which local health and safety problems can be solved mainly or merely by mobilising local efforts may be questioned. Local communities are increasingly affected by wide, far-reaching societal trends. Indeed, in a world where societies are becoming increasingly heterogeneous and populations more mobile, as people are becoming “cosmopolitans” rather than “locals,” the local, geographically defined community may lose much of its decisive influence over the lives of its population. Researchers have referred to “the end of community as we know it” (Kempny, 2000) when discussing the increasingly globalised conditions of contemporary society. The globalisation process represents a serious challenge to the community-based approach.

8.4. Methodological considerations

Studies A, B, C, D, and E of this thesis are empirical, meaning that they used observable, real-world experience, and information as the way of generating knowledge (Punch, 1998). Studies F and G are theoretical, with formalised sets of concepts that organise observations and explain phenomena (Graziano & Raulin, 2000). The incorporation of theory into research is not always straightforward. The notion of “theoretical arrogance” implies that empirical work is disregarded so that theory becomes an end in itself or that theory is so powerful that it prescribes in advance what the researcher is going to find (Punch, 1998; Blaikie, 2003).
Study F delineates seven principles, i.e. underlying assumptions, of the community-based approach to health and safety programmes. The prime motivation behind the study was the lack of systematic organisation of the body of knowledge about this approach and a desire to make its assumptions explicit in order to test whether they are supported in experience. Similarly, the conceptual and evaluation model described in study G was borne out of a need to synthesize knowledge about multifaceted injury prevention programmes in order to capture the complexities of these programmes, as existing models in the scientific literature tend to overlook critical aspects (such as the two aspects of programme process and the two dimensions of the safety concept). Theories and models can profoundly influence what the researcher chooses to study, but they should not determine in advance the answers to the research questions around which research is designed (Blaikie, 2003). However, studies F and G are not intended to answer research questions in themselves, but rather to aid in the process of obtaining more knowledge about the “how” and “why” of community-based injury prevention. Theories and models are judged by how useful they are in organisation of information and explaining phenomena, not whether they are right or wrong (Graziano & Raulin, 2000).

The results of studies B, C, D, and E, which analysed community-based injury prevention programmes operating in Scandinavian WHO-designated areas, are not necessarily characteristic of programmes in other parts of the world and/or other funding mechanisms and programme administration. Generalisability is the capacity of studies to extrapolate the relevance of their findings beyond the boundaries of the samples (Sarantakos, 2005). Scandinavia enjoys relative economic wealth and high health standards, including lower injury rates, than most other parts of the world (Spinks et al., 2005a). Study E compared WHO Safe Community and Canadian Safe Community Foundation programmes. While the two programme models share many characteristics, including similar designation criteria, the Canadian programmes are not self-funded to the same extent as the Scandinavian programmes.
The exploratory nature of study C on sustainability constrains the conclusions to be drawn from this study. The factors favouring sustainability identified are not intended as an exhaustive list of all possible “determinants” of community-based injury prevention programme sustainability. Other studies may reveal and prioritise other factors depending on programme type, context, and availability or utilisation of different types of resources.

There are several potential sources of bias in the studies of this thesis. The systematic review in study A encompassed 16 community-based injury prevention programmes from eight countries. While all programmes fulfilled certain criteria for inclusion in the review, it is obvious that there might be considerable heterogeneity among the programmes with regard to factors that influence the effectiveness. This makes it difficult to compare the effectiveness of the programmes. However, an important aspect of the review was to identify factors potentially or actually influencing the effectiveness.

The assessment of programme effectiveness in study A did not differentiate between injuries at different severity levels, i.e. deaths, hospitalisations, and non-hospitalisations. However, the construct validity (the extent to which measures are accurate representations of trends in injury occurrence) of emergency department presentations has been questioned, since accessibility to medical treatment of minor injuries is highly dependent on social, demographic, health service supply, and access factors (Walsh et al., 1996; Beattie et al., 1998; Cryer et al., 2000). Similar factors may affect hospitalisation rates, but most likely to a lesser extent. It has been suggested that a case definition of injury that is based on some severity threshold is the most appropriate (Cryer et al., 2002). Furthermore, the accuracy and completeness of non-hospitalised injury registration may differ considerably among communities/programmes (Kopjar et al., 2000). It is noteworthy that under-registration in some of the evaluations in study A was estimated to be over 30% (Schelp, 1987). In contrast, the proportion of missing cases in the Swedish Hospital Patient Register, used in study B, is estimated to be less than 1% (Socialstyrelsen, 2005).
With regard to the systematic review in study A, a problem facing studies collected from the literature is that they may not be a representative sample due to a publication bias. The probability that a study reaches the literature depends on the results of the study. Thus, publication bias is a tendency to publish results that appear significant, because negative or neutral results may not reach publication (Cooper, 1998). However, the results of study A did reveal highly disparate results, with several evaluators complaining about the lack of or insufficient effectiveness of the evaluated programmes. Considering that relatively few community-based injury prevention programmes have been evaluated in the scientific literature, publication bias appears to be less likely in this field than in many other areas of research.

The study design in study B’s evaluation of the effectiveness of the 14 Swedish WHO-Designated Safe Communities yields a sort of selection bias, as each municipality is compared with its municipality group, which clearly are not identical. While age adjustments in the study controlled for differences among the municipalities and municipality groups, study areas may have differed with regard to any number of factors, including socio-economic status and miscellaneous factors such as climate and infrastructure. All of these differences can affect programme effectiveness (Barss et al., 1998; Moodie, 2002; McClure et al., 2005). When randomised assignment is precluded, no certain method exists for assuring that an evaluation will avoid selection bias (Frankfort-Nachmias & Nachmias, 1996). Another potential bias is changes in admission policies, therapeutic technologies, and diagnostic coding practices over time (Ekman et al., 2005). Such changes may indeed have been effected during the 1987-2002 period, yet it is likely that they were implemented in a similar manner nationwide.

Studies C, D, and E gathered data from key informants. For this method to be effective, key informants must be reliable and must be asked about things they are likely to know about. Several key informants should also be consulted, since no one informant can provide information about all the nuances of the phenomenon the researcher is interested in. Key informants are usually selected more on
their basis of their competence and the specific information they have, rather than how representative they are (Patton, 2002). For studies C, D, and E, the selected representatives for all Swedish WHO Safe Community programmes were initially interviewed by telephone to investigate their knowledge, experience, and involvement with different aspects of their programmes. These key informants were found to be quite knowledgeable about most/all aspects of the programme. No respondent had been involved with the programme for less than one year, and some had been involved for over 10 years. However, corresponding background data were not collected for the Danish and Norwegian programmes in studies D and E, as the questionnaire to these programmes did not request this information. In contrast, the questionnaire to Canadian Safe Community Foundation programmes in study E included background data to ascertain that the representative for each programme had the necessary knowledge about his/her programme. Fifty-six per cent of the respondents for the Canadian programmes replied that they were involved with “most/all aspects” of the programme and had “very good” programme knowledge, 31% stated that they were involved with “many aspects” and viewed their knowledge as “good,” while 12% were “new to the programme” and thought themselves to be “still learning.” Canadian respondents’ direct programme experience ranged between one and nine years, with an average of 3.6 years programme involvement.

Studies D and E surveyed 31 Scandinavian WHO Safe Communities, of which 25 responded, yielding a response rate of 81%. Non-respondents in survey research are usually quite different from those who participate, thus limiting the investigator’s ability to make generalisations about the entire population. It is well known that more motivated, opinionated, and well-organised people are more likely to respond (Brodie et al., 1997). However, a dropout analysis did not reveal any noticeable differences in terms of designation year and community population size between the WHO Scandinavian Safe Communities that participated in the study and those that did not.
In addition to study D’s 25 Scandinavian survey group, study E also investigated 16 Canadian Safe Community Foundation programmes. The response rate among the Canadian programmes was much lower than for the Scandinavian, as only 40% of the Canadian programmes responded. However, a typical response rate for a mail survey is between 20 and 40% (Frankfort-Nachmias & Nachmias, 1996), suggesting that the response rate pertaining to Canadian programmes was, in fact, to be expected. It is difficult to determine the extent to which this type of bias has relevance for study E. The dropout analysis failed to reveal substantial differences between the participants and non-participants, except that programmes operating in the smaller communities tended to be among the non-responders. Programmes in larger communities may have easier access to local injury data. Thus, a potential bias could be that the participating Canadian programmes were primarily those that have local injury data available and devote a great deal of effort to assembling and analysing these data. Hence, differences between Canadian and Scandinavian programmes may have been exaggerated because the participating Canadian programmes were not fully representative of the whole Safe Community Foundation network. It is also possible that programmes not using local injury surveillance data misinterpreted the purposes of the study and thought that they would have little to contribute, although this did not seem to be the case with the Scandinavian programmes, of which 28% did not have access to injury surveillance data. The fact that only 16 Canadian programmes responded to the questionnaire means that each reply was afforded great weight.

There were a large number of missing responses to two questions in study E regarding data availability and frequency of documenting and analysing local data. This may imply a paucity of knowledge in these areas among the programme representatives, underscoring the necessity of a very cautious interpretation of these two questions. The Canadian programmes generally scored higher rates on two questions of the questionnaire. This may indicate that the wordings of the different questions and response options of the English and Swedish questionnaires have slightly different meanings. There may also be
important cultural differences between the two regions under study that could account for differences in these self-reported scoring rates.

Studies D and E used e-mail (electronic mail) for the data collection. Research indicates that e-mail tends to provide faster but fewer questionnaire responses than regular mail (Parker, 1995; Kittleson, 1995; Mehta & Sivadas, 1995; Mavis & Brocato, 1998; Paolo et al., 2000). The lower response for e-mail has been explained by the ease of deleting unwanted mails and by e-mails never being checked. Another problem is invalid e-mail addresses, as people change providers or servers and allow their previous e-mail accounts to go dormant (Seguin et al., 2004). On the other hand, research findings provide evidence that the overall data quality obtained from e-mail questionnaires is comparable to or even better than that obtained from regular mail (McCabe et al., 2002). For instance, it has been shown that respondents to e-mail surveys make fewer errors in completing them and omit fewer response items than respondents do in paper surveys. Furthermore, e-mail responses tend to be more honest and less socially acceptable (Seguin et al., 2004).

8.5. Future research

The results of the work contained here has provided new insights on the evidence of the effectiveness of community-based injury prevention programmes. The research also has expanded upon existing conceptual models of injury prevention programmes to clarify the underlying mechanisms for such programmes. Thus, the thesis has contributed to the knowledge base regarding “does it work?” and “how does it work?”.

The thesis also has shed new light on the “why” of community-based health and safety programmes. However, the “why” is a vast, elusive question that will require a great deal of further research for improved understanding and explanation. Future research needs to move beyond
narrow outcome-oriented black box evaluations towards more sophisticated, pluralistic research. This is required to provide a stronger knowledge base to successfully replicate programmes in new settings. Seven important areas for future research on community-based injury prevention should be explored.

First, studies investigating the association between resource investments and programme effects are required to determine the quantity needed to produce favourable effects. As demonstrated in study F, substantial resource requirements is a more or less explicit assumption of the community-based approach to health and safety programmes. The issue is defining what “substantial” means in community-based injury prevention practice and the extent to which this principle is applied. Some of the studies of this thesis suggest that the Scandinavian model facilitates “duration-over-intensity,” which may not yield the critical mass needed to produce community-wide effects. What financial resource investments (for example estimated per 1,000 population of a community) are needed to produce favourable effects? To what extent can differences in resource investments in injury prevention explain the differences seen with injury rate levels and changes over time? The cost-effectiveness of community-based injury prevention programmes remains a largely unexplored field of research, as very few such studies have been conducted (Lindqvist, 2002).

Second, more research is needed to investigate the relationship between programme effects and the delivery and exposure to programme components. Finding out “what works” in community-based injury prevention is of tremendous public health importance. Currently, it is difficult to translate “theoretical” effectiveness into “population-based” effectiveness (Glasgow et al., 2003; Petridou, 2003). For example, while wearing of bicycle helmets may be efficacious, not all community-based programmes that promote the widespread use of bicycle helmets are necessarily effective. Dose-response and component analyses have proven problematic in studies of community-based injury prevention programmes because of the difficulty of isolating effects of specific measures. It would probably be more feasible to study the
effects at an aggregate level, as seen in a recent study. This Swedish research project analysed the correlation between a number of implemented “evidence-based” measures (i.e. quantity of programme delivery) and the injury rates in these municipalities, and found that the broader the range of measures, the lower the injury rates (Sellström et al., 2003). To assess both the quality and quantity of programme delivery, it is necessary to determine the extent of implementation of measures at different quality levels. These levels could possibly be categorised into measures of proven efficacy, promising efficacy, and unknown efficacy (with an additional category identifying ineffective or counterproductive measures), based on reviews of different injury prevention measures. Analysis should not be constrained to the quantity and quality of implemented strategies and measures, but also examine the extent to which they have actually been taken up in practice and are functioning as intended. Such research requires assessment of programme exposure, i.e. data gathering from programme recipients.

Third, there is a need for improved understanding with regard to the various contextual factors that impact on programme effectiveness. National-level studies on how indicators such as unemployment, years of schooling, and gross national product correlate with injury rates have been conducted (e.g. Melinder, 2000). Study B suggested that some of the variation in injury rate levels could be explained by differences in the municipalities’ socio-economic status, as this is a well-known risk factor for injury. More research is required to identify additional community-level indicators that may have significant impact on programme effects, and to explore how the effectiveness of programmes may interact with specific aspects of different communities. The work in study B might be expanded upon by examining the association between a larger number of municipality-level indicators and injury rate levels and changes, potentially generating important knowledge about factors that account for substantial variability in effects. Study G identified a number of commonly-used demographic and socio-economic community indicators, but more knowledge is needed about how to best
characterise communities. A related issue is the extent to which extra-community factors influence programme effects. This is an area where more research is called for, not least in light of an increasingly globalised society. A community is part of a wider system, which means that regional, national, and even international forces will in various degrees affect local communities.

A fourth suggestion for future research is to conduct comparative analysis on the ways that different funding mechanisms affect programme effectiveness. This thesis has focused on the Scandinavian model of integrating injury prevention programme activity among the routine functions of responsible municipalities or counties. Study E also investigated programmes belonging to the Canadian Safe Community Foundation network. The study revealed many interesting differences with regard to the use and utilisation of injury surveillance data between the two regions. Further research is required to explore advantages and disadvantages in the short and long run of the Scandinavian model in comparison to programme models that rely more on external funding.

Fifth, further steps should be taken toward operationalising and measuring the many intangible resources that affect community-based health and safety programmes. Such investigations could clarify both organisation-level concepts like human, relational, and structural resources and community-level concepts such as community capacity, community empowerment, community participation, community competence, and community readiness. Better consensus on how to operationalise and measure many of these concepts would facilitate comparisons of findings. Direct comparability would likely contribute to improved understanding of the associations between programme effectiveness and intangible resources, including the principles of “community member participation” and “intersectoral collaboration.”

A sixth future research area concerns subjective safety. There is a need for improved understanding of the complex interplay between the objective and subjective dimensions of safety. If safety science is going
to move beyond the prevention of injuries and toward holistic safety promotion, subjective safety must be considered as an explicit goal and an important outcome variable of safety programmes (Nilsen et al., 2004). An interesting question is how would accounting for subjective safety change safety programme content? Risk groups and target categories identified by epidemiological injury analysis may not be identical to the ones recognised in studies of subjective safety, thus resulting in different priorities concerning the implementation of interventions. There are already questionnaires designed to capture aspects of subjective safety (e.g. Department for Victorian Communities’ community strength indicators survey in Australia and Institut national de santé publique Québec’s survey on personal safety and victimisation in Canada). Future research may be more an issue of validating and modifying existing tools for research purposes rather than developing new instruments.

Finally, a seventh future research area is improved programme evaluations. The conceptual and evaluation model developed in study G should be tested with real-life evaluations. The model emphasises the importance of not only measuring the effects in terms of injury rates, but also considering attitudinal effects, injury risk effects, and subjective safety effects. To conduct a full model evaluation is potentially very difficult and will likely require a great deal of resources. The model is already planned for use as a framework for evaluations of community-based injury prevention programmes in Sweden and Australia. The feasibility of conducting evaluations based on the model will be assessed. Additional use of the model by others could confirm its overall utility.
9. Conclusions

The findings from the studies (and the framework) of this thesis support a number of conclusions with regard to the three research questions posed.

- **There is limited evidence for the effectiveness of community-based injury prevention programmes.**

International community-based injury prevention programmes applying multiple strategies to target multiple injury categories, as evaluated in the scientific literature, have achieved varying degrees of effectiveness when measured as reductions in injury rates. More narrowly focused programmes, targeting specific injury categories, have generally achieved more success than broader, more multifaceted programmes if assessment of effectiveness is based on injury rate reductions for the targeted injury categories. Community-based injury prevention programmes operating in 14 Swedish municipalities designated WHO Safe Communities generally achieved modest degrees of effectiveness (injury rate reductions) between 1987 and 2002. Few of the programmes operating in these municipalities demonstrated more favourable results than municipalities without such WHO Safe Community designation, or Sweden as a whole.

- **Some of the problems of providing convincing evidence of why community-based injury prevention programmes work or fail are due to the methodological difficulties of evaluating these programs and to evaluations that lack sufficient information on important programme aspects.**

Issues pertaining to study design, validity of study findings, and statistical power of evaluations of community-based injury prevention programmes contribute to the difficulties of evaluating these programmes. Evaluations often lack information on the financial
resources that were required to achieve certain effects, while intangible resources are rarely considered at all. Process assessments tend to be constrained to brief descriptions of the activities that were undertaken in the programme. This does not document how many participants actually received programme components. Provision of contextual data is also overlooked, which makes it difficult to project the effects to other programmes.

- While community-based injury prevention programme effectiveness requires sustainability of programme operation, sustainability in and of itself does not ascertain programme effectiveness.

Sustainability of programmes operating in Swedish WHO Safe Communities depends on several factors, with no one factor being either primary or by itself sufficient for sustainability. Financial, human, and relational resources lay the groundwork for sustainability for these “local government-integrated” programmes, although programme intensity may be compromised if committed key persons depart the programme or if there are changes in the priority-setting by municipality political decision makes. Structural resources such as injury surveillance, programme goals, and evaluation play less crucial roles in sustainability.

- Community-based injury prevention programme effectiveness is associated with the amount of financial resources available to a programme.

Financial resources set the parameters for the delivery of programme components and the community population’s exposure to these components. Resource constraints contribute to the modest degrees of effectiveness (injury rate reductions) achieved by programmes operating in Swedish municipalities with WHO Safe Community status. The Scandinavian model of incorporating programme activity into the routine function of a responsible municipality or county facilitates sustainability to a higher degree than intensity of resource investment and programme activity. For many Scandinavian
programmes, resource constraints include insufficient time, knowledge, and personnel. These constraints contribute to the lack of programme evaluation and difficulties in making effective use of injury surveillance data.

- **Community-based injury prevention programme effectiveness is associated with the programme context.**

  Effectiveness is influenced by the interaction between the context and different programme elements and effects. Variations in community characteristics impact the causes, types, and prevalence of injury, thus influencing the resource requirements, feasibility of different strategies, and the extent to which the community population can be reached and exposed to the programme. Community-based injury prevention programmes need to be adapted to the unique characteristics of the community in order to achieve effectiveness. The context also extends beyond the community, as the programme effects may be influenced by wide, far-reaching societal trends.

- **There is inconclusive evidence regarding the importance of some of the “success factors” described in the scientific literature for achieving community-based injury prevention programme effectiveness.**

  WHO-designated community-based injury prevention programmes operating in Scandinavian municipalities and counties do not evaluate programme results. They rely predominantly on broadly stated goals rather than specific objectives. When selecting interventions, these programmes often rely upon intuitive and subjective methods, such as discussions in networks, feedback from the general public, and experiences gained in their own work and those shared by other programmes, rather than more objective methods. This style of decision making is “experience-based” rather than evidence-based. Most Scandinavian Safe Community programmes have access to locally collected data, but many programmes devote limited time to the analysis of this assembled data. This indicates that they are not successful in effectively translating injury surveillance data into
applicable action and into relevant knowledge for programme improvement. As the Swedish WHO Safe Community programmes achieved relatively modest levels of effectiveness (injury rate reductions), it is not clear whether this was due to a failure to apply these so-called success factors or whether these factors are less important for programme effectiveness than purported.

- *Seven principles, representing key assumptions of the community-based approach to health and safety programmes, can be identified. Some of these principles may have important theoretical shortcomings, while other principles appear not to be widely or fully applied in programme practice. The implication is that many of these programmes do not function at an optimum level, which could explain some of the difficulties in demonstrating effectiveness.*

The community focus principle is particularly problematic, as programmes, to a great extent, define geographical or geopolitical units as communities. However, because these entities can be highly heterogeneous and characterised by a weak sense of community, insufficient community mobilisation (community member participation and intersectoral collaboration) and inadequate reach for many programmes may result. The evidence for multifaceted interventions, long-term programme view, and substantial resource requirements to attain effectiveness is well supported by evidence. The principles of community member participation and intersectoral collaboration are somewhat less convincing, as there is a lack of research that links programme effectiveness to this type of community involvement. Community-based programmes often narrowly target specific injury categories. However, it is quite possible to obtain highly favourable results for specifically targeted injury categories without necessarily achieving population outcome improvements.
Community-based injury prevention programmes can be modelled by specifying a chain that describes causal linkages between different programme elements and effects.

A model for the causal mechanisms of multifaceted injury prevention programmes needs to substantially elaborate on the so-called Donabedian’s triad (resources, processes, and effects) by adding the context as an integral element, by distinguishing between two dimensions of the process (dose delivered and received), by distinguishing between two dimensions of both risk and safety, and by specifying several types of effects. The inclusion of subjective safety represents an important digression from previous frameworks/models for evaluating injury prevention programmes, all of which have assumed more of a direct linkage from exposure via risk to injury.
Notes: Countries for all publishers except from Great Britain and the US are provided. Texts in languages other than English are noted.


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