## Abstract

Recognizing the need for a more comprehensive approach to preventing child homicides that result from family violence, the authors applied Haddon's three methods of injury prevention to the context of family violence: modification of the agent of injury; identification of control strategies to intervene in the process of injury; and application of the comprehensive Haddon Matrix to explore pre-event, event, and post-event strategies addressing the child, parent, and the environment. Examples of evidence-based strategies were identified to support this approach, and innovative strategies were suggested which build on existing approaches applied to other contexts. Recommendations and implications for research and practice are discussed.


## Introduction

While only a small proportion of children at risk die at the hands of their parents, all of these deaths are unacceptable, and we believe in many cases that they may be preventable. This paper proposes the use of a comprehensive public health framework in responding to the problem of child homicide committed by parents with mental health and substance use problems. In this context, mental health and substance use problems are defined as one or more diagnosed or undiagnosed psychiatric disorder(s) of perception, thinking, emotions and/or behavior, and/or psychoactive substance use that significantly interferes with the individual's functioning at home, school, work and/or within the community. Faced with the ongoing need to develop meaningful responses to child deaths, we looked for structured approaches that would enhance our service-oriented view and provide a unique perspective on these tragedies, with the intent of stimulating innovative approaches. The methodology delineated by Haddon (1980) in his seminal work on injury prevention provides a perspective not traditionally used in social service planning, and offers a fresh view on these complex circumstances. It also offers a process for the collaborative development of strategies that respect the distributed responsibilities across sectors. It

offers a framework to identify the gaps in evidence-based policy and practice and thus provides guidance for research and evaluation efforts. Our approach, applying Haddon's framework to child homicide, is theoretical, rather than purely practical, although we will identify the starting point for practical applications. We embarked on this work because we recognize the vulnerability of the large number of children who are exposed to family violence, yet the same strategies, which have been demonstrated as insufficient, continue to predominate approaches to addressing this problem.

We see the application of a new framework for addressing child homicide as necessary for several reasons. Firstly, there is growing recognition that the exclusive focus on child removal is insufficient: there is a need to take a broader public health approach in preventing child maltreatment (Covington, 2013). Secondly, while the majority of psychiatrically disturbed parents do not injure their children, the elevated risk to the children of parent(s) with mental illness and substance use is well-established (Brockington et al., 2011; Forrester, 2008; Friedman & Resnick, 2007; Pritchard, Davey, & Williams, 2013; Stroud & Pritchard, 2001). However, the associated social stigma and chronically relapsing nature of these conditions makes them notoriously difficult to identify and treat, particularly in parents who are concurrently faced with stressors such as poverty, racism, and lack of social supports (Freisthler, 2006; McCroskey, Pecora, Franke, Christie, and Lorthridge, 2012; Pritchard et al., 2013; Sheppard, 2007; Spinelli, 2005). Thirdly, family violence is such a significant public health problem, with an estimated 686,000 child victims and 1,640 fatalities in the US in 2012 (Children's Bureau, 2012), that the removal of all children at risk is unfeasible and not without potential harms (although removal of children from violent parents is included as one approach to child protection), especially given that family violence is not typically considered a sole justification for child removal (Lavergne et al., 2011).

In the wake of tragic cases of child homicide, detailed enquires are made, hearings held, reports drafted. Responses over the years have ranged from minor program changes and enhancements, to entire

system renewal and change in government structures (Gove, 1995). Frequently, the health and social service systems are found lacking, and are charged with improving processes and filling gaps in service, with the child welfare system continuing to be tasked with the responsibility of child removal as the principle means of preventing maltreatment and child homicide. Yet Wilczynski (1997) argued that focusing on individual cases of filicide ignores broader social issues, such as social stress, race, power and gender. In spite of frequent attempts at child welfare system improvements, the problem of child maltreatment persists.

According to Haddon (1980), injuries are an epidemiological problem, which share many characteristics with classic infectious diseases and other well-understood forms of pathology. Like diseases, injuries require a causal agent, to which the individual has greater or lesser susceptibility or resistance, which are carried by vehicles, and contained by vectors. Injury prevention strategies can focus on modifying not only the causal agents, but also vehicles, vectors and the individuals' susceptibility or resistance, thereby expanding the range of effective prevention approaches aimed at stopping the injury from occurring.

Rather than the purely inductive methods typically used in child homicide research, which have tended to focus on in depth investigation of individual cases, or identifying common risk factors among children who die at the hands of their parents, our approach uses a deductive method, in which Haddon's approach to preventing all types of injury is applied to the specific problem of injury to children caused by a mentally ill or substance impaired parent.

There are several advantages to this approach. Firstly, the responsibility of preventing child deaths does not depend solely on an unattainable, omniscient ability to predict violence in a specific parent, but is shared across social agents including health and social systems, school, work, friends, family, community, housing and income support agencies; this is consistent with current thinking on joint

responsibility in safeguarding children (Webber, Mccree, and Angeli, 2013). It also recognizes the parent and the child as active agents in prevention, and for this reason, we explicitly consider approaches that can be taken in empowering older children, despite the fact that the majority of child homicides occur in infancy (Pritchard et al., 2013).

Secondly, applying Haddon's approach to child homicide allows us to focus on the technicalities of injury and its prevention, liberating policy-making thinking from the denial and perceived helplessness felt when faced with the horror of child homicide by the child's own parent. While it may seem easier to believe that such events are uncontrollable than to look closely into what actually occurred, our position reflects Haddon's argument in his landmark paper on injury prevention, that "all known injury distributions are highly non-random in time, place and person, just as one would expect from the non-randomness of their causes" (Haddon, 1980). Establishing a public health framework therefore allows us to determine future preventative measures for similar situations.

Thirdly, by working from the injury itself as the starting point, towards the context in which it occurs, we are able to expand our thinking about the problem, and identify gaps in our understanding of child injury and its methods of prevention. Haddon's approach is designed to prevent all actual and potential injuries, so we are not tied to the anecdotal details of known child homicide cases.

Psychological (Lanier, Kohl, Benz, Swinger, & Drake, 2012), community and social supports can substantially moderate the influences on family violence (Covington, 2013). This paper, therefore, addresses how, as health and social service providers and policy makers, we can expand the current repertoire of actions taken to prevent and mitigate the impact of these injuries, harnessing the complexity of the moderating factors to reduce the risk and severity of this form of injury.

## Methods

### Applying Haddon's Approach to Preventing Family Violence

Injury prevention covers a wide array of possible interventions at multiple levels. Haddon developed three methods for determining where to focus injury prevention efforts: identifying and modifying the characteristics of the agents of injury; identifying control strategies to intervene in the process of injury; and applying the Haddon Matrix to explore pre-event, event, and post-event strategies addressing the host, vector, and environment. Haddon's approach was developed as a general injury prevention strategy, and has not been applied to the specific forms of injury caused by child maltreatment.

Each of these three methods was applied to the specific goal of preventing lethal injury to children by parents with mental health and substance use problems, using deductive reasoning and brainstorming (Osborne, 1953).

**Method 1: Identifying and Modifying the Agents of Injury**

The first method we applied was identifying the various causes of death, and ways in which the agents of injury, vehicles of injury, and vectors of injury through family violence might be modified to prevent lethality. This was accomplished by analyzing the form of energy, means of transmission, and vector of each cause of death in potential cases of child homicide.

The agent of injury in the context of the current work is the energy directed towards the child by the parent, which causes potentially lethal injury, while the parent is the vector of that energy. Haddon (1980) cited Gibson (1961) in delineating the necessary, specific agents of injuries as mechanical, thermal, radiant, chemical, or electrical, which Haddon recognized as sometimes being negative agents, when a factor necessary for health is absent. Examples of the kinds of agents required to lethally injure a child are mechanical, as in the case of battery, stabbing, shooting or strangling; chemical, as in the case of poisoning, gassing, inducing corrosive burns, or drowning; thermal, as in the case of inducing burns by the application of heat; and electrical, as in the case of electrocution. Negative agents involve the

withdrawal of a necessary factor for life, as in the case of starvation, exposure to cold temperatures, and suffocation.

The energy agents which cause the injury require a means of transmission, known as a vehicle and/or vector (in the case of filicide the parent) although additional vehicles and vectors may be involved.

**Method 2: Identifying Control Strategies to Intervene in the Process of Injury**

The second general injury prevention method we applied to the specific problem of child homicide was used to identify control strategies to intervene in the process of injury, essentially, to prevent the vector of injury (the parent) from lethally injuring the host of the injury (the child). Haddon identified ten general strategies that "encompass not only all injury reduction countermeasures, but also, literally, all measures actually or theoretically available to reduce damage … from any and all … hazards." These strategies were analyzed with respect to the various processes of injury involved in child homicide, and deductive reasoning was used to develop examples of logical, concrete strategies, which are specific to reducing injury to children by parents with mental illness and substance use problems.

We then used the brainstorming approach (Osborne, 1953), drawing from our expertise in public health medicine, coroners' service work, and psychology to generate ideas for translating these specific strategies into applicable interventions. We conducted a series of cursory preliminary searches of the following databases (CINAHL, MEDLINE, PsychARTICLES, PsycEXTRA, PsychINFO, and SocIndex) to identify examples of applicable evidence-based strategies in the literature in support of the ideas generated. We focused our search on strategies that were published in peer-reviewed journals, which either directly meet the criteria of the specific strategy, or use the approach we identified in a different context. These examples are provided by way of illustration, and do not represent a comprehensive review of the literature, which is beyond the scope of the current paper.

### Method 3: Applying the Haddon Matrix

The third method applied was the use of the Haddon Matrix to analyze and generate sample strategies addressing the host (child), vector (parent) and environment. The Haddon Matrix is a comprehensive approach to injury prevention that was developed to specifically consider intervention at every point before, during and after an event in which an injury occurs. It consists of a 3x3 matrix of factors (human, vehicle, and environment), and phases (pre-event, event, and post-event).

The original Haddon matrix was expanded to accommodate the three phases, with pre-event sub-divided to include separate control measures for whole population and high-risk populations. The factors were expanded to include control measures directed at the child ("human" in Haddon's matrix), the parent ("vehicle" or "vector" in Haddon's matrix). The environment factor was sub-divided into health/social services system; school/work; friends/family/community; and housing/income. The resulting matrix was populated with the results generated by method 2, and expanded with further brainstorming, based on our knowledge of existing community resources, or reasonable adaptations thereof.

## Results

### Agents, Vehicles and Vectors of Injury

The various causes of death which could result in child homicide, and ways in which the agents of injury, vehicles of injury, and vectors of injury through family violence might be modified to prevent lethality, were identified and analyzed. In applying this method to the prevention of lethal injury through family violence, we determined that at present, for most causes of death identified, addressing the agent is not immediately feasible. With the exception of restricting access to firearms, parents cannot be prevented from accessing a variety of agents, ranging from plastic bags to bathtubs, with which to lethally injure their children.

In terms of modifying the vehicles of injury, while it may appear somewhat absurd to suggest that the manufacturers of the vehicles of injury identified consider that safety features be incorporated in their designs, it should be noted that Haddon (1980) made a similar observation about the inclusion of seatbelts and airbags into the design of cars – features that today we take for granted as common sense, essential aspects of vehicles.

As the vector of the agent, control strategies can be directed at the parent, and the cause of the malfunctioning of the parent's decision making process, that puts into action the process that leads to the child's lethal injury, i.e. the parental mental illness or substance related disorder which impairs the parent's ability to treat the child with appropriate care, nurturance, and protection. These were considered in more detail using method 2.

**Control Strategies to Intervene in the Process of Injury**

Table 1 details the results of applying Haddon's ten general control strategies to the processes of injury involved in child homicide. The first column contains Haddon's original general control strategies. The second column contains the resulting control strategies specific to preventing or reducing injury to children, which address the process of injury in family violence. The third column contains examples of evidence-based strategies, which demonstrate the practical application of the specific control strategy.

Specific control strategies were generated for each of the ten general control strategies provided by Haddon (1980). These ranged from those well-known and established in the child welfare field, to those that are well-known but not consistently utilized in practice or considered to be part of essential child protection services, to those that were taken from other contexts and applied to child welfare as novel approaches. Row numbers provided below refer to numbered rows in table 1.

**Table 1: Ten Strategies for Reducing Injury to Children by Parents with Mental Health and Substance Use (MH/SU) Problems**

| | **General Strategy (Haddon, 1980)** | **Specific Strategy** | **Examples** |
|---|---|---|---|
| 1 | Prevent creation of the hazard in the first place. | Prevent the development of MH/SU problems in potential parents. | Primary prevention targeting early attachment to develop resilience in future parents (Svanberg, 1998); secondary prevention to adolescents/adults at risk (Carbone, 2010; Geschwind et al., 2010; Mandal & Zalewska, 2012). |
| 2 | Reduce the amount of hazard brought into being. | Reduce the severity of MH/SU problems in potential parents and parents. | Early intervention of mental illness (Wade et al., 2007), substance use disorders (Baldwin et al., 2005), domestic violence (Bekemeier, 1995); expectant parents (Dawley, 2007; Landy et al., 2012; Olds et al., 2010), and parents (WHO, 1996). |
| 3 | Prevent release of hazard that already exists. | Prevent violence from occurring in families with MH/SU problems | Teach anger management to parents (Wilson et al., 2013). Parenting training (Barth, 2009; Sanders et al., 2003). Family therapy (McWey, 2008). |
| 4 | Modify the rate or spatial distribution of | Reduce the severity of violent behavior at | Teach self-awareness/mindfulness and de-escalation skills (Delaney & |

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| | release of hazard from its source. | times when it is triggered. | Johnson, 2006) to children (Thompson & Gauntlett-Gilbert, 2008) and their parents (Carmody & Baer, 2008) with MH/SU problems. |
| 5 | Separate in time or space, the hazard and that which is to be protected. | Separate living arrangements for children when the parent is at risk of becoming violent. | Supportive respite for parents (MacDonald & Callery, 2004; supportive foster care for children (Buehler et al., 2006). |
| 6 | Separate the hazard and that which is to be protected by interposition of a material barrier. | Identify potential physical barriers between the parent and child and teach the child how to use the barrier. | Make escape plans (Ballesteros & Kresnow, 2007) for children at risk, e.g. lock self in bathroom and call for help if parent becomes violent. |
| 7 | Modify relevant basic qualities of the hazard. | Modify symptoms of the MH/SU problem within the parent, relevant to the risk of homicide. | Assess for key child homicide risk characteristics (Pritchard et al., 2013); medication; psychotherapy for parents (Barrowclough et al., 2006; Dawe, 2007; Swartz et al., 2008). |
| 8 | Make what is to be protected more | Develop skills within the child to resist | Self defense training (Stevenson, 2006) for children at risk. |

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|---|---|---|---|
| | resistant to damage from the hazard. | violence. | |
| 9 | Counter the damage already done by the hazard. | Rescue children from parents who have been violent. | Remove children from violent parents or parents from children (Harpaz-Rotem et al., 2008) and enforce laws. |
| 10 | Stabilize, repair, and rehabilitate the object of damage. | Stabilize and rehabilitate abused children. | Provide medical care (Bradbury-Jones & Taylor, 2013) stable living arrangements, and trauma therapy for abused children (Vicario et al., 2013). |

Well-known and well-established approaches to reducing injury in children of parents with mental illness and substance use problems, with familiar strategies identified in the peer-reviewed literature, included the following. Row 5 details separating in time or space, the hazard (i.e. the potentially violent parent) and that which is to be protected (i.e. the child), with examples of separate living arrangements for parent and child when a parent has been violent, or is deemed to pose a significant risk of violence, with supportive respite for parents (MacDonald & Callery, 2004) and supportive foster care for children (Buehler, Rhodes, Orme, & Cuddeback, 2006). Row 9 details countering the damage already done by the hazard, for example, by removing the child from the parent's care (Harpaz-Rotem, Berkowitz, Marans, Murphy, & Rosenheck, 2008). Row 10 specifies stabilizing, repairing, and rehabilitating the object of damage (i.e. the child), with examples of medical care (Bradbury-Jones & Taylor, 2013), and trauma therapy for abused children (Vicario, Tucker, Smith, & Hudgins-Mitchell, 2013).

Well-established approaches that are not consistently provided included those focused on prevention and treatment of the mental health and substance use disorders in the parent. Row 1 details prevention of mental health and substance use problems within the community, with examples of primary prevention to develop resilience in future parents, when the parents themselves are in infancy (Svanberg, 1998), and secondary prevention for vulnerable adolescents and adults (Carbone, 2010; Geschwind et al., 2010). Developing attachment and resilience in early childhood not only supports the individual child (Miller-Lewis, Searle, Sawyer, Baghurst, & Hedley 2013; Kochanska & Kim, 2013), but also shapes the mental health of the adult that child will become (Carbone, 2010; Gershwind et al., 2010; Mandal & Zalewska, 2012). Preventing mental illness and substance use problems from developing in adolescents and adults protects future children, by giving potential parents the skills to withstand the stresses of life with reduced susceptibility to mental illness and substance use problems.

Row 2 specifies reducing the severity of mental health and substance use problems in potential parents and parents, including examples such as early intervention of mental illness (Wade, Johnston, Campbell, & Littlefield, 2007), substance use disorders (Baldwin, Johnson, Wayment, & Callahan, 2005), domestic violence (Bekemeier, 1995), problems in adolescents, expectant parents (Dawley, 2007; Landy, Jack, Wahoush, Sheehan, & MacMillan, 2012; Olds et al., 2010), and parents (WHO, 1996). Row 3 delineates preventing violence from occurring in families where mental health and substance use problems have been identified, with the example of family therapy (McWey, 2008). Row 7 specifies modification of specific symptoms of the mental health or substance use problem within the parent, particularly those that have been identified as relevant to the risk of child homicide. Examples include assessment for the key psycho-criminological indicators associated with child homicide, including child poverty, having mentally ill parents, parents' previous convictions for violence, and having a mother with a child on the Child Protection Register (Pritchard et al., 2013); and providing parents with

medication and psychotherapy (Barrowclough et al., 2006; Dawe, 2007; Swartz et al., 2008).

Novel approaches that have been developed in other contexts, but are not, to our knowledge, used as part of an injury prevention approach to children, include a variety of strategies enhancing the skills of both parents and children through training. Row 3 details preventing the release of pre-existent hazards, i.e. preventing an act of violence by a parent with a history of violence, with the example of teaching anger management to potentially violent parents who are nonetheless motivated to develop the ability to care for their children safely and effectively, in cases where the decision has been made that the child will remain with, or have access to the parent. While anger management training methods are well established (Wilson et al., 2013), we are not aware of their application to parents. Row 4 details modifying the rate or spatial distribution of release of hazard from its source, i.e. slowing down the transition from the emotional experience to the behavioral expression of the parents' anger. Similarly to anger management, the examples of teaching children and their parents mindfulness, and teaching children de-escalation skills, would reduce the risk of violence occurring when triggered, and would be suitable in situations where parent and child are motivated to remain together; in cases where a risk has been identified, but the decision has been made not to remove the child. Mindfulness has been successfully taught to both children (Thompson & Gauntlett-Gilbert, 2008) and adults (Carmody & Baer, 2008), although not in this context. De-escalation skills have been taught to adults working with psychiatric patients (Delaney & Johnson, 2006), but not to children, who could potentially make the greatest use of them.

Row 6 specifies separating the hazard (i.e. the violent parent) and that which is to be protected (i.e. the child) by interposition of a material barrier, with the example of escape plans for children. Escape planning is a well-established part of injury control in relation to fire (Ballesteros & Kresnow, 2007), and is routinely taught to children in fire drills. The same approach could potentially be used to enhance

safety in children who have been identified as at risk, but who remain with their parents.

Finally, Row 8 details making what is to be protected (i.e. the child) more resistant to damage from the hazard, with the example of self-defense training for children. Self-defense training is typically offered to women who have been assaulted (Stevenson, 2006), but is not routinely taught to children. Viewed as a harm reduction approach in the context of the worst scenario, the benefit to a child being faced with a violent parent is obvious. Learning these skills would also potentially provide the child with improved self-esteem, self-efficacy, and the ability to protect themselves from bullying and abuse in other contexts.

**Applying the Haddon Matrix**

Table 2 shows the expanded Haddon matrix, populated with example control tactics identified for each cell of the matrix. This table provides a framework for prevention and interventions directed at children, parents, and across the community, at all three time phases relevant to injury prevention. Some will take effect immediately on implementation, for example, 24/7 urgent services, while others will take decades to prove effective in reducing child deaths, for example, developing early attachment in infants.

Pre-event strategies include approaches that reduce the factors known to contribute to the development of mental health and substance use conditions, as well as those that exacerbate stress on parents, compounding their mental health and substance use problems, and increasing the likelihood of violence. These are identified for the whole population, and for high risk populations. They go beyond the strategies identified in table 1, to include aspects of the social and physical environment which reduce the impact of poverty, which, in combination with mental health problems, increases the risk of violence (Pritchard et al., 2013).

**Table 2: Family Violence Injury Prevention Framework Based on Haddon Matrix**

| Timeline/Focus | | Child | Parent | Social/Physical Environment | | | |
|---|---|---|---|---|---|---|---|
| | | | | **Health/ Social Services System** | **School/ Work** | **Friends/ Family/ Community** | **Housing/ Income** |
| **Pre-event** | **Whole Population** | • Early attachment to develop resilience | • Parenting skills<br>• Early attachment to prevent mental health and substance use problems | • Dissemination of information about available supports | • Awareness and modelling of healthy relationships<br>• Mental health education<br>• Anti-violence training | • Awareness of family violence<br>• Identification and reporting of situations of risk<br>• Community connections | • Reduce/eliminate financial dependence on parent/partner<br>• Safe, secure housing and food for families and noncustodial parents.<br>• Safe accessible child care |
| | **High Risk Population** | • Understanding of needs, rights and available supports | • Resilience factors<br>• Understanding of responsibilities, needs, and available supports<br>• Acknowledgement and action on issues that increase risk eg. anger management, family therapy | • Screening/triage to identify adolescents and families at risk<br>• Specialized intervention programs targeting adolescents, expectant parents, and parents<br>• 24/7 Urgent services | • Family mental health interventions at school<br>• Mental health supports in the workplace<br>• Collaboration with available service providers | • Empowerment to intervene/seek assistance<br>• Understanding of appropriate interventions and available services<br>• Support for parenting skills and relationship building between parent and child | • Reduce/eliminate policies encouraging deception (e.g. relationship based means testing)<br>• Integrated health and social service support<br>• Safe accessible child care<br>• Respite services<br>• Emergency shelter provisions |
| **Event** | | • De-escalation skills<br>• Self defense skills<br>• Escape plans | • Mindfulness skills<br>• De-escalation skills | • Provide cellphones to children at risk<br>• Crisis Intervention in the right setting<br>• Protection of others at risk | • Self-defence training for children/youth | • Support to cope<br>• Identification of others at risk | • Supportive foster care<br>• Emergency shelter provisions<br>• Long term housing options |
| **Post-event** | | • Access to care | • Understanding of responsibilities, needs, supports<br>• Acknowledgement and action on issues that increase risk<br>• Participation in secondary prevention programs | • Trauma informed care to children<br>• Remove violent parent from child<br>• Provide mental health, substance use, and violence treatment to parent<br>• Enforce laws or therapeutic alternative | • Support to classmates, colleagues | • Non-judgemental support to cope<br>• Identification of others at risk | • Safe, secure housing and food for families and non-custodial parents |

Mental illness and substance use problems do not develop randomly, and there is evidence to show that the social context, including neighborhood poverty, housing, food insecurity and unemployment are associated with the maltreatment of children (Freisthler, 2006). Policies that mediate these environmental factors have the potential to enhance the ability of parents and caregivers to develop safer, more stable, and nurturing relationships, and to decrease child maltreatment at the population level (Saul et al., 2014). The application of this method forces us to acknowledge that failure to address these modifiable determinants continues to put children at higher risk of harm.

Event strategies are those interventions that will have an effect during an event of potential or actual family violence.

Post-event strategies are interventions that assist and support victims after family violence has occurred, ideally reducing and repairing the damage done, and reducing the likelihood of the violence being repeated or further consequences. These strategies include reducing the negative impact on the community as a whole, for example, providing support to classmates and colleagues, who are not typically considered victims in these circumstances.

## Discussion

We initially used the Haddon Matrix as a method for mapping the interventions across the time phases and intervention points, then expanded the work to include Haddon's two additional methods. The process of taking this approach was as enlightening as the results; we made several observations that we believe are important in understanding the challenges of addressing child homicide. While we found it encouraging that many evidence-based examples of interventions have been developed, we also found ourselves considering aspects of injury prevention in ways we do not typically think of, resulting in some surprising realizations about how we address violence towards children.

Firstly, when faced with the horror of child homicide, there is a natural tendency to dismiss the

process as uncontrollable, and to avoid thinking about what actually happens within and between the parent and child during an episode of family violence. Applying this methodology to child homicide was an emotionally charged process, particularly as it required in-depth focus on the experiences of the child victims. In overcoming this tendency, with the guidance of Haddon's methods, we became liberated from these feelings of powerlessness, as we realized that many factors contributing to child injury are, in fact, open to modification. What emerged through this process was a broadening of perspective, through the recognition that there are multiple ways that intervening at many different points in time can reduce the risk of injury to children.

Secondly, the tendency to focus on the adults involved, rather than the children, became very apparent. Yet applying Haddon's Matrix required us to overcome this tendency, just as preventing injury through motor vehicle accidents requires us to consider aspects of the vehicle, the driver, the passengers, and the environment (such as speed limits) in which the injury might potentially occur. We came to recognize that children are active agents with vulnerabilities that can also be countered.

Perhaps the most important revelation was that in identifying methods for equipping children to better defend themselves from injury, for example, by teaching them self defense skills, the system would be compelled to face the horrific vulnerability of children living in circumstances of domestic violence. Providing adult women with those same skills to defend themselves against potential attackers has thus far somehow been deemed more palatable. By recognizing and facing the vulnerability of these children, and giving them to tools to defend themselves, we can develop the control strategy identified by Haddon as "make what is to be protected more resistant to damage from the hazard," which may be overlooked in child protection practice (Lavergne et al., 2011).

The application of Haddon's (1980) general injury prevention methods, specifically methods 2 and 3, has resulted in a preliminary framework for a comprehensive approach to the prevention of potentially

lethal injury to children by parents with mental health and substance use problems. This approach is more extensive than those focused exclusively on child removal, and addresses aspects of the social and physical environment, as well as vulnerabilities of children and parents. The framework in table 2 provides a starting point for policy makers and service planners, which can be adapted to meet the needs and resources of the specific community under consideration.

The framework highlights the need to consider the continuum of public health actions in addressing the problem of child maltreatment (Covington, 2013), from prevention and health promotion, through intervention and post-event treatment. It also emphasizes the role of a variety of social agents, from formal roles, such as health and social care professionals, to professionals with roles indirectly related to child maltreatment, such as school personnel and workplace colleagues, and informal roles within the family, friendships, and the wider community.

The framework adds to existing knowledge about preventing lethal injury to children by parents with mental health and substance use problems by integrating evidence on the predictability of child homicide, existing strategies and novel approaches, and prevention of injury from a public health perspective, across multiple time points and intervention points. The approach brings together interventions at multiple lifespan stages, from the parents' infancy, early childhood and adolescence, to their own process of becoming parents and coping with mental health and substance use problems, to equipping the child to become more able to cope with violence in a parent. This emphasizes the advantages of addressing the problems contributing to family violence before they become severe.

Some of the strategies recommended are already well-established approaches to the prevention of mental illness and problematic substance use, and interventions with people at risk, and those who already have mental health and substance use problems, including parents and expectant parents. In addition, Haddon's methods demonstrate the importance of consistently applying familiar strategies,

such as physical separation of children from parents with a history of violence. As noted, in practice, past domestic violence may not determine the decision to remove a child from the home, and the lack of connection between domestic violence history and foster care placement, or ongoing child protection services, has been raised by other authors (Lavergne et al., 2011). This is particularly important given the weight of evidence that such parents present the highest risk for child homicide (Pritchard et al., 2013). We recommend that each of these proven strategies become integrated into standard of practice in the prevention and mitigation of injury to children through parental violence.

In addition, clearer guidelines are needed to establish the most effective processes for determining the need to remove children from parents or parents from children when a parent has been violent or is at risk of becoming violent. In some cases of child homicide, the parent had a history of violence towards adults, including their partners, but not children. Research indicates that social workers do not typically consider family violence as a sole justification for child removal (Lavergne et al., 2011), and this phenomenon clearly requires careful review. Options for relocation of the violent parent from the family home (with adequate re-housing provision), rather than placing the child in a foster care location, are not prominent in the literature. These options have the potential to reduce stress on children when they are separated from their parents.

The thoroughness of Haddon's approach enables us to identify gaps in our current efforts to prevent child homicide. In particular, we have identified that the agency of both parent and child are inadequately addressed in current approaches, and could be harnessed through training across a variety of skills, including mindfulness, de-escalation, self-defense, and escape planning. We could certainly do much more to improve children's resilience and resistance to violence, yet we anticipate that this is the most controversial aspect of the approach, as it may be misconstrued as seeming to imply responsibility on the part of the child.

The agency of the child when faced with a violent parent is rarely considered, yet many older children may be capable of learning and applying safety measures when faced with an assault. We recommend that children identified as at risk by reason of living with parental mental illness and problematic substance use should routinely be empowered by being offered self-defense classes, coaching in developing and implementing an escape plan in the same way that fire and earthquake drills are provided to coach children to avoid injury through their behavior during disasters, and provided with means to call for help if needed. This adds to, rather than detracts from, these children's need for protection. The cost of a cellular phone to be provided to a child at risk is negligible, particularly as any cell phone with a charged battery can be used to make 911 calls throughout North America, without requiring payment (Furchgott, 2000), and there is a large volume of obsolete cell phones.

Haddon pointed out that susceptibility to injury agents greatly influence the occurrence and nature of injuries in populations. While this would not be applicable to some of the causes of death, such as poisoning, or to very young children who are highly vulnerable and defenseless to injuries being inflicted on them if they are in the unsupervised care of their mentally ill or substance-impaired parent, there is potential to consider the differences in susceptibility of older, more autonomous children, to injuries through physical attacks by parents. Some of these differences in susceptibility are inherent, such as the physical strength and problem solving skills of the child, and some can be acquired, for example, by training high-risk children to implement an escape plan or to defend themselves using martial arts skills. Children can also be taught de-escalation skills to assist in recognizing increased agitation in a parent, and calming a parent if they notice this is happening. Their own ability to remain calm in such a stressful situation would be enhanced through learning mindfulness skills. If this fails, they can then implement an escape plan.

We emphasize that we do not condone the use of any one strategy in isolation, and in particular,

we are not suggesting that a child should carry the sole responsibility for defending him or herself against a violent parent. This particular strategy is included as a last resort, when all other efforts to prevent injury have failed. Rather, we are suggesting that a comprehensive approach to injury prevention includes the use of any and all applicable strategies, including health promotion, prevention, harm reduction, early intervention, treatment, and rehabilitation.

Taken together, implementation of the framework would raise the overall level of social support available to vulnerable families, an important factor in decreasing the risk of family violence (Sheppard, 2007). The potential for violent behavior in mental illness is not located exclusively within the individual, but is the result of an interplay between the predispositions and coping skills of the parent, the stresses they are under, and the circumstances under which violence occurs. Parents who are attempting to support their children in a context of deprivation and stigma have an accumulation of stress, which can reach lethal levels if appropriate supports are not available (Stroud & Pritchard, 2001).

The agency of the parent is also important, and may be overlooked particularly when they have mental illness and substance use disorders. Teaching parents practical skills in managing the expression of their own frustrations to protect the safety of their children is also important. This includes teaching parents anger management skills to prevent violence from occurring (Wilson et al., 2013), and we suggest that this should be provided, along with mindfulness training, to assist the parent in curbing the outward expression of anger through violence when crises occur. Parenting training has been demonstrated to reduce the risk to children when a parent has a mental health or substance use disorder (Sanders, Cann, & Markie-Dadds, 2003; Barth, 2009), and we recommend that this is consistently made available to parents who wish to improve their parenting skills. Family therapy has also been demonstrated to improve outcomes for families at risk of child removal (McWey, 2008).

There are several motivations that parents have for lethally injuring their children (McCroskey et

al., 2012). Some are the result of the mental illness itself, for example, if the child is the focus of a delusion or hallucination, which is a symptom of psychosis. Others occur when the parent is suicidally depressed, and unable to separate child from self, resulting in murder of the child prior to suicide. Fathers who consider their partners and children their property may kill their children out of jealousy or malice towards their partner, particularly if threatened with separation or divorce (Liem & Koenraadt, 2008). Mothers may believe their child would be better off dead (Friedman & Resnick, 2007). In many cases, these motivations can be modified through interventions such as the appropriate use of psychiatric medications and psychotherapy (Gilligan & Lee, 2005a, 2005b; Goldenson et al., 2009).

We recommend that the development, evaluation, and implementation of these strategies through partnership with research and community organizations are prioritized. Supporting evidence-based public policies and programs that sustain healthy school and community environments not only to prevent these injuries, but also support early recognition of problems as they arise, and help mitigate the devastating impacts of these events when they occur (Reinke, 2006).

The use of multiple dimensions of prevention and intervention, as recommended by Haddon's methods, increase the likelihood of successful prevention of lethal injury to children in the context of family violence, and distribute the responsibility for child protection across a variety of measures, rather than focusing all on parent surveillance and child removal. The framework specifically recognizes the wider societal influences on the development of mental health and substance use problems, and challenges communities to provide social environments that prevent these conditions and minimize the stressors that impact on families.

**Future Research, Policy, and Practice**

While the proposed framework provides an overview of how child protection practice can be improved, there are several limitations requiring further research and consultation prior to being

integrated into policy and practice. Firstly, the content of the framework was generated solely by the authors, and further consultation with experts in the child protection field, other social agents, and people with lived experience, would be helpful in refining it further. Comprehensive literature reviews on each of the strategies proposed would also strengthen the work.

Secondly, field-testing is required to ascertain whether such a framework is feasible in practice, and what resources and/or adaptations would be required of the current system to implement it. The individual strategies cited range from those that are well-established, such as child removal, to novel strategies that have not, to our knowledge, been put into practice. Field-testing for feasibility and further research to assess effectiveness are required. It will be particularly important to ensure that any interventions are acceptable and supportive to children and families, and that any unanticipated negative consequences are identified and addressed.

Thirdly, for the framework to be fully put into practice, extensive public education would be required. There may well be resistance from many parts of the social and physical environment to take on supportive roles, particularly given the stigma associated with mental illness, substance use, and family violence. Indeed, it is likely that this stigma is a major cause of the isolation and lack of social support that is implicated in many cases of child homicide (Pritchard et al., 2013).

In addition, resistance is anticipated from the professionals across the community, such as teachers, income support workers, etc, who may already feel that their roles are unclear and excessive. The payoff to the community as a whole would need to be emphasized for the community as a whole to take ownership of their roles in being part of the solution proposed here.

In summary, the framework we have developed from Haddon's matrix is a promising tool for the comprehensive identification of interventions, and as a guide for communities in the planning and prioritization of these initiatives. It allows a variety of stakeholders to take action in their particular areas

of responsibility in a coordinated and mutually supportive framework and can lead to novel and unconventional approaches. In addition, applying Haddon's methods provide deeper insights into the many contributing factors to child homicide, and how they can potentially be intercepted.

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