ABSTRACT

Title of Document: THE ASSOCIATION OF VIOLENCE WITH
                            YOUNG CHILDREN'S PHYSICAL HEALTH
                            IN COLOMBIA

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                            Family Science

The association of violence with the physical health of children under five

years of age in Colombia is studied through the lens of three major theories:

biological stress theory, family stress theory, and ecological theory.

The analysis explores the association of harsh parental discipline and intimate

partner violence with child health, as well as the association of community violence

with child health, parental discipline, intimate partner violence, and the relations

among them.

Secondary data from the Colombian Demographic and Health Survey 2005

and the Colombian National Census 2005 were analyzed. A total of 10,681 children

under five years of age from 230 municipalities were included in the analyses.

Analyses were conducted at the family and community levels.

In the family level models, parental harsh discipline and intimate partner

violence were associated with poor child health. Families who used harsh discipline

had children with approximately 8% more symptoms of poor health than those who didn't use such punitive practices and families who experienced intimate partner violence had children with approximately 20% more symptoms than those who did not experience such violence.

In the multilevel models, community violence and intimate partner violence predicted poor child health while parental harsh discipline failed to predict it. Children living in violent communities had 16% more symptoms of poor health than those living in nonviolent communities, and children from families that experienced intimate partner violence had on average 18% more symptoms of poor health than those living in families without intimate partner violence.

Despite the study limitations, mainly its cross-sectional nature and restraints imposed by secondary data, the results indicate that violence is related to young Colombian children's poor physical health. These findings suggest the need to continue studying the effects of violence on health outcomes in different populations, as well as to provide support for efforts to promote violence prevention programs in Colombia.

THE ASSOCIATION OF VIOLENCE WITH YOUNG CHILDREN'S PHYSICAL
HEALTH IN COLOMBIA

By

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Dedication

To all the children suffering the effects of violence.

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Introduction

Child health in Colombia has improved over the last decade, as it has in the rest of the world. Still, twenty children out of every one thousand die before reaching the age of five ("Monitoring the Situation of Children and Women," 2009). Young children are mainly affected by undernutrition, diarrhea, acute respiratory infections, and injuries (World Health Organization, 2009).

Poverty greatly affects child health; the under-five mortality rate among the lowest-income quintile families in Colombia is six times higher than that of the highest-income quintile families, and three times higher than that of the general population. Children are highly susceptible to environmental insults. Factors such as poverty, income inequalities, poor housing, inadequate sanitation, armed conflicts, community violence, domestic violence, low education, and poor parenting practices have been proposed as possible determinants of child health in the country (Caceres, Estrada, DeAntonio & Pelaez, 2005; "Colombia," 2006; World Health Organization, 2009).

Violence is the most frequent cause of mortality in Colombia. Political and drug related violence have been prevalent for decades. As a culture of violence has spread in the country, many violent behaviors have been accepted as normal aspects of day-to-day life by the Colombian population (World Health Organization, 2009). Social violence could affect child health directly or through its effects on families (Berkman & Kawachi, 2000).

One serious problem facing Colombian children that results from this culture of violence, but which has not been thoroughly studied, is children's exposure to violence inside their homes ("Colombia," 2006; World Health Organization, 2009). Many parents use aggressive punishing styles that are difficult to disentangle from child abuse. Additionally, children witness and suffer

from different forms of domestic violence. Their influence on Colombian children is likely dramatic, yet there are not many studies linking a violent home environment to a child's health, and even fewer exploring this relationship in the developing world (Harway & O'Neil, 1999; Jones Harden & Koblinsky, 1999; Summers & Hoffman, 2002).

Investigations addressing the influence of community violence on child health are relatively new, and there is an absence of published research on this topic conducted in low to middle income countries, such as Colombia. Most of the samples in previous studies are very limited and not based on national surveys (Onyskiw, 2003). More research is needed, particularly in different cultures, using different instruments and targeting minority children with multiple exposures (Feerick & Silverman, 2006; Heise, Pitanguy & Germain, 1994). The high rates of both individual and community violence in Colombia lead us to study their consequences.

This project examines the association between violence and child health. It explores this association through four pathways: (i) a direct association between harsh parental discipline and child health; (ii) a direct association between intimate partner violence and child health; (iii) an association between intimate partner violence and child health, mediated by harsh parental discipline; and (iv) an association between community violence and child health, both directly and through intimate partner violence and parental discipline. This project also considers maternal education as a possible moderator of the effects of violence on child health. Child health is defined as the absence of the most common symptoms of infectious diseases in the last 2 weeks. See figure 1 for a schema of the proposed research study.

Figure 1. Schema of Proposed Research

Level 2:
Community

| Community Violence |

Level 1: Family and
Child

| Intimate Partner Violence |

| Maternal Education |

| Parental Harsh Discipline |

| Child Health |
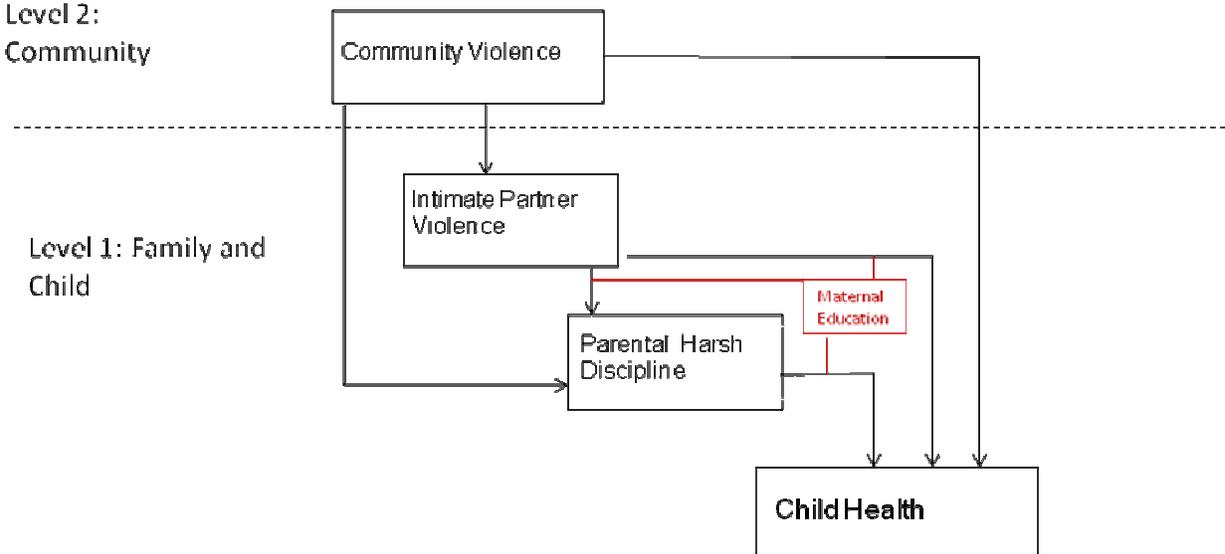
Chapter 1: Theory

This project considers the association of violence with child health through the lens of three major theories: biological stress theory, family stress theory, and ecological theory.

According to *biological stress theory,* violence causes physical and psychological injury to a child's health. Under *family stress theory,* violence causes stress to families and the accumulation of stressors without family resources to offset them results in families behaving violently towards children and each other, affecting children's health. Finally, according to *ecological theory,* the interaction of violence and other factors at the community and family levels affects children's health.

Under biological stress theory there is a direct link between violence and harm. Violent acts may result in physical trauma, increased risk of infection, psychological harm, permanent disability, and even death. Violence against children predisposes them to many negative outcomes, such as developmental delays (Kolko, Moser & Weldy, 1999), permanent brain damage (Lewis, 1992; Teicher, 2002), post traumatic stress disorder (DeBellis et al., 1999), behavioral problems (Kolko, 2002; Righthand, Kerr & Drach, 2003), chronic diseases (Batten, Aslan, Maciejewski & Mazure, 2004; Felitti et al., 1998), and mental diseases (Duran et al., 2004; Hillis et al., 2004).

Exposure to early stress, such as child abuse or pain, exacerbates preexisting psychobiological vulnerabilities (Lewis, 1992). The developing brain adapts to stress in at least three different ways: 1) it sets off the release of stress hormones, which in turn have the capacity to change the shape of the largest neurons in the hippocampus and can even kill them, 2) it

suppresses the production of new neurons, and 3) it affects neurotransmitters and GABA receptors producing excessive electrical activity (Teicher, Samson JA, Polcari & McGreenery, 2006). The mechanism works well for short-term survival, but it eventually leads to psychiatric and immunologic problems and increases the risk of diseases such as obesity, type II diabetes, and hypertension (Teicher et al., 2006).

According to *family stress theory* (McKenry & Price, 2005), families are systems that function to ensure the growth and survival of their members. Under this theory community violence causes stress to families and the accumulation of stressors without family resources capable of offsetting these stressors leads to family violence. Family violence manifests itself in many ways, including intimate partner violence and poor parenting practices.

Using an adaptation of the theory's ABC-X formulation (McKenry & Price, 2005):

(A) Stressor event 1: community violence causes stress to families (Fox & Benson, 2006).

(B) Family resources: Maternal education, economic resources, health insurance coverage, and other services help to neutralize the effects of violent behaviors and provide some level of protection to children. As an example, maternal literacy has proved to be the major predictor of child achievement (Sastry & Pebley, 2010).

(C) Meaning attached to the event or perception: When children and families perceive violence (community violence) as unfair, these perceptions generate additional stress that helps to produce intimate partner violence and poor parenting practices, resulting in negative health outcomes.

(X) Outcome 1: Family violence. The accumulation of stressors without the resources to offset them produces intimate partner violence and punitive parenting.

(X) Outcome 2: Family violence injures child health.

Family stress theory also explains how intimate partner violence causes stress to parents. If the parents do not have resources and perceive this aggression as unfair they would be more likely to use harsh discipline practices and to ignore their children's health needs.

Finally, according to *ecological theory* (Belsky & Stratton, 2002; Bronfenbrenner, 1977), the health and well-being of children are affected not only by the children's characteristics but also by the characteristics of the family and community. Under this theory, the interaction of violence and other factors at different environmental levels affects children's health. These environmental levels include: the individual level, which refers to the characteristics of the child; the family level; and the community level.

The study of factors at the community level is essential to propose population-based interventions (Mears & Visher, 2005). The community characteristics have the potential to affect child health. Socioeconomically deprived neighborhoods have been shown to lack clean water supply and good sanitation (Berkman & Kawachi, 2000; McDonald, Bailie, Grace & Brewster, 2009), which have been directly implicated in the incidence of infectious diseases ("Monitoring the Situation of Children and Women," 2009; World Health Organization, 2009). Additionally, the availability of healthy food and other resources in low income neighborhoods is usually limited. This constraint has been associated with malnutrition (Berkman & Kawachi, 2000; Moestue & Huttly, 2008; Singh, Kogan & van Dick, 2008; Uthman, 2009) but also with

increased obesity because of the substitution of cheaper but less nutritious foods for higher priced nutritious ones.

Consistent with social learning theory, ecological theory and family stress theory, social violence has been associated with domestic violence and injuries (Haynes, Reading & Gale, 2003; Reading, Langford, Haynes & Lovett, 1999). In turn, exposure to violence during childhood has been associated with negative child health outcomes (Bremner & Vermetten, 2001). Community violence may affect children's health directly or through intimate partner violence and harsh discipline. Intimate partner violence is the result of the interaction of individual, family, and social environmental factors (Belsky, 1993); the greater the number of stressors at different environmental levels, the greater the probability of its occurrence (DeMaris, Michael, Fox, Hill & Wyx, 2003; Harway & O'Neil, 1999).

Chapter 2: Literature Review

According to the World Health Organization (WHO): "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" ("Constitution of the World Health Organization," 1948). Child health can be defined as comprising a child's or adolescent'e complete physical, mental, and social well-being.

Children are the future so ensuring their good health must be a priority for all societies. Throughout childhood biological systems continue to develop. Keeping healthy during this period of time is essential to protect still-immature structures, to guarantee optimal development, and to create a strong foundation for the remainder of children's lives. Children are vulnerable, especially during their first years of life (Kuh, Ben Shlomo & Ezra, 2004). Noxious exposures during this period have the potential to generate long term consequences (Kuh et al., 2004). Early stressors during childhood result in lasting effects on stress-responsive neurobiological systems, including the hypothalamic–pituitary–adrenal axis, the noradrenergic system, the hippocampal systems, and the brain areas involved in learning and memory (Bremner & Vermetten, 2001; Cicchetti, 2002). Additionally, stressors have the potential to cause deficits in the immune system (Bremner & Vermetten, 2001).

This chapter reviews the existing literature on the association between violence and child health. The chapter has six sections, which follow closely the possible links introduced in the previous chapter (see Figure 1 at page 3). The first section reviews the literature on severe parental physical discipline and child health; the second one focuses on intimate partner violence and child health. The third section reviews literature on community violence, family violence and child health. Section four provides an overview of the literature on the relation between maternal education and child health. Section five presents information on other factors that have

been associated with child health, and the final section describes existing literature on all the above elements in the Colombian context.

2.1. Harsh Discipline and Child Health

According to the American Psychological Association, parenting practices are "specific parenting behaviors that arise in response to particular parental goals" (Gerric & Zimbardo, 2002). Being a good parent is not an easy task. It requires a balance between setting and enforcing limits while showing affection and listening to the child, keeping a child safe while providing the necessary freedom, spending time with the child while leaving space for his/her personal development, leading by example while not forcing children to mirror their parents, and providing order and consistency while showing some flexibility.

The quality of parenting is a continuum that has, at one end, very nurturing parenting and, at the other end, very serious abuse that leads to child death (Newcomb & Locke, 2001). Many parenting practices are good in some circumstances but not in others. Determining when a parenting practice becomes abuse is difficult. As an example, many people approve the use of physical punishment while others consider it detrimental for child development and, therefore, a type of abuse (Barnett, Miller-Perrin & Perrin, 2005). There is no clear definition of child abuse; it depends on social values and culture. A distinction between ethics or universal truths and emics or realities of a particular group must be considered (Summers & Hoffman, 2002).

It is well recognized that children need nurturing parenting to ensure their optimal development. The influence of parenting practices on children's behavior has been widely studied and documented. It is less clear, though, how parenting practices influence child health (Shirtcliff, Coe & Pollak, 2009).

Discipline is an important component of parenting (Barkin, Scheindlin, IP, Richardson & Finch, 2007). Parents use different techniques to discipline their children. The most common ones are spanking, removal of privileges, time-outs, and yelling (Barkin et al., 2007). Discipline may be excessive. Harsh discipline can become physical abuse. Child physical abuse not only causes physical and emotional injuries, which can lead to permanent disability or even death, but is also associated with long-term negative outcomes, such as mental problems (Duran et al., 2004; Hillis et al., 2004), behavioral problems (Kolko, 2002; Righthand et al., 2003; Shannon, 2009), cognitive and emotional difficulties (Kolko et al., 1999; Shannon, 2009), permanent brain damage (DeBellis et al., 1999; Teicher, 2002), and chronic diseases (Batten et al., 2004). It has been hypothesized that child physical abuse may impact the maturation and regulation of physiological systems (Shirtcliff et al., 2009).

DeBellis et al. (1999) assessed 44 abused children and adolescents with Post-traumatic Stress Disorder and 61 matched controls, using neurological and psychological tests, and magnetic resonance imaging. They found that the maltreated children had smaller intracranial and cerebral volumes than the matched controls. Brain volume was positively correlated with child age and negatively correlated with duration of abuse. This suggests that younger children are more vulnerable to abuse, which in turn supports biological stress theory. The authors proposed that traumatic experiences increased levels of catecholaminergic neurotransmitters and steroid hormones, and these substances affect the development of the brain.

Duran et al. (2004) studied 234 American Indian women age 18–45 who sought outpatient ambulatory services at a community-based hospital. After controlling for social and demographic characteristics, they found that women who suffered from physical abuse during

childhood were 3.9 times more likely to experience Post-traumatic Stress Disorder, and 2.3 times more likely to suffer mood disorders.

Hillis et al. (2004) studied a retrospective cohort of 9,159 adult women who attended a primary care clinic in San Diego, California. They found that more adverse experiences during childhood (which included emotional, physical, or sexual abuse; and exposure to domestic violence, substance abuse, or a mentally ill or criminally accused household member) were positively associated with adverse psychological sequelae during adolescence and adulthood.

Kolko el al. (1999) compared 210 children who were classified on the basis of their history of physical and sexual abuse with a group of children who did not share this history. The researchers found that physically abused children were more likely to present early developmental delays, adverse neurologic signs, serious physical injuries, skin markings and scars, and to engage in stimulant drug use than their non-physically abused peers.

Teicher and colleagues have studied the effects of early abuse on brain function for a long time. They started in 1984 by exploring the relation between early abuse and dysfunction of the limbic system. They created a score of Temporal Lobe Epilepsy-related symptoms (symptoms suggestive of limbic damage) and measured 253 adults from an outpatient mental health clinic. Compared with patients who reported no abuse, average scores were 38% greater in the patients who reported physical abuse. Moreover, they found that the earlier the onset of the abuse, the higher the number of symptoms (Teicher, 2000). Later they measured the association of childhood physical abuse and brain-wave abnormalities in electroencephalograms (EEGs) by reviewing the records of 115 consecutive admissions to a child and adolescent psychiatric hospital. The researchers found clinically significant brain-wave abnormalities in 72% of patients with a history of child abuse but in only 27% of non-abused patients (Teicher et al., 2006). They

also compared the EEG results of 15 healthy right-handed volunteers with those of 15 right-handed child and adolescent psychiatric patients who had a confirmed history of child abuse. Finding revealed that the left cortices of the healthy control subjects were more developed than the right cortices, as expected for their dominant hemisphere. In contrast, the maltreated patients had their right cortex more developed than their left. The development of the right cortex was the same for both groups. Finally, studying 18 young adults (18-22 years old) with a history of repeated abuse and 19 matched controls, Teicher and his co-workers observed no differences in hippocampal volume but found a 9.8% average reduction in the size of the left amygdala, which correlated with feelings of depression and irritability or hostility (Teicher et al., 2006). Once these brain alterations occur, they often become permanent (Teicher, 2000; Teicher, 2002; Teicher et al., 2006).

Bremner et al. (2001) studied the MRI scans of 17 adult with posttraumatic stress disorder, all of them survivors of child abuse, and compared them with matched controls. The left hippocampus of abused patients was, on average, 12% smaller than the hippocampus of the control subjects.

Finally, Shirtcliff et al. (2009) compared Herpes virus antibody levels in children exposed to physical abuse with the levels in children from the general population. They found that children who had been exposed to physical abuse had higher levels of antibodies and suggested as an explanation that the immune system of these children is weaker than that of the general population. High levels of antibodies reflect a chronic infection that the immune system has not been able to control.

<u>*2.2. Intimate Partner Violence and Child Health*</u>

This section reviews existing literature on the association between intimate partner violence and child health, both directly or through the mediation of parental discipline practices.

2.2.1. Intimate Partner Violence

Intimate partner violence refers to any physical, emotional, and/or sexual aggression or threat of aggression against a current or former partner (Feerick & Silverman, 2006). By definition either member of the couple can suffer from it. However, most victims are women; millions of them are victimized every day around the world (Barnett et al., 2005). Women have a greater risk of suffering violence at home than in any other place (Flowers, 2000). Domestic violence is the leading public health risk to adult women. Approximately 50% of the homicides of women in the world are perpetrated by their intimate partners ("Department of Economic and Social Affairs," 2009).

Intimate partner violence is a leading public health concern. It produces 9.5% of all disability-adjusted life years lost for women aged 15-44 (Ellsberg & Heise, 2005). Billions of dollars are spent every year on medical costs, disability, and lost productivity. Many of the victims die and the survivors not only suffer the direct effects of injuries but also short and long term physical and emotional consequences (Center for Disease Control and Prevention (CDC), 2008). These consequences have been very well documented; they include chronic pain, central nervous system disorders, gastrointestinal disorders, heart conditions, and sexually-transmitted diseases, to name a few. The psychological consequences include emotional disorders (e.g., post-traumatic stress, depression, anxiety, eating problems, sleep problems, multiple personality, and obsessive/compulsive disorders), behavioral problems, low self-esteem, isolation, Stockholm

syndrome, and cognitive difficulties (Campbell, 2002; CDC, 2008; Heise et al., 1994; Morewitz, 2004).

There are no common characteristics that predict unequivocally that someone would be a perpetrator of intimate partner violence. Anyone can be a perpetrator regardless of age, race, gender, socioeconomic status, occupation, education, religion, personality trait or psychiatric diagnosis. Most perpetrators do not have any psychiatric diagnosis and are only violent at home (Summers & Hoffman, 2002). Neither are there common characteristics of victims. Intimate partner violence affects people from any age, race, gender, occupation, socioeconomic status, or medical diagnosis, although single women with children are the highest risk population (Lauritsen & Schaum, 2004).

2.2.2. Intimate Partner Violence and Child Health

Even if children are not abused directly, children are disturbed by an environment of violence. Most children in violent households witness violence, even if their parents try to shelter them from it. Children hear, see, and in some cases participate in it (Hutchison & Hirschel, 2001; Lemmey et al., 2001). They feel scared, anxious, angry, powerless, depressed, and isolated. They do not perceive their parents as reliable caretakers. The development of a secure attachment in this context is very challenging for these children. Many become aggressive, display low academic achievement, and develop health and behavioral problems (Radford & Hester, 2006).

Children cope with intimate partner violence in different ways. Some reject the violence and others learn that violence is an acceptable way to deal with life's problems. They can get close to the non-abusive parent, resent the non-abusive parent for continuing in this situation, defend themselves and their non-abusive parent against the abuser, and/or escape from home. Many feel affection and loyalty to the abuser (Radford & Hester, 2006).

Studies of the effects of intimate partner violence on child health have been based mainly on small samples of children critically exposed to violence. Most of these children have been evaluated in shelters (Onyskiw, 2003). Although minimal data and study limitations preclude one from accepting a causal association between intimate partner violence and child health (Bair-Merritt, Blackstone & Feudtner, 2006; Jones Harden & Koblinsky, 1999), child exposure to intimate partner violence seems to be associated with a variety of psychiatric disorders, includingmainly post traumatic stress disorder, antisocial personality trait and depression (Bair-Merritt et al., 2006; Feerick & Silverman, 2006; Haj-Yahia, Tishby & de Zoysa, 2009); cognitive and behavioral difficulties (Bair-Merritt et al., 2006; Ferguson, San Miguel & Hartley, 2009; Koenen, Moffitt, Caspi, Taylor & Purcell, 2003; Martin & Clements, 2002; Onyskiw, 2003); and poor physical health, including infectious diseases, allergies, and other chronic illnesses (CDC, 2008; Shannon, 2009;). Additionally, children witnessing domestic violence can also be accidentally harmed (Lemmey, McFarlane, Willson & Malecha, 2001).

Haj-Yahia et al. (2009) found that the greater the children's exposure to parental intimate partner violence, the higher the probability of being diagnosed with Post-traumatic Stress Disorder. The data were collected through a survey of a convenience sample of 476 students from Sri Lanka.

From a survey of 603 predominantly Hispanic children and their families in Texas, Ferguson et al. (2009) found that children from families in which the father emotionally abused the mother were more likely to present aggressive behaviors than children from non-abusive families.

Studying 48 preschool children (21 boys and 27 girls) and their parents in a lab setting and surveying their preschool teachers, Martin and Clements (2002) found that children exposed

to marital aggression were more likely to present behavioral problems at school than children without this history (Martin & Clements, 2002).

Koenen and colleagues (2003) studied the influence of witnessing domestic violence on Children's IQs. IQs were assessed for a population sample of 1,116 monozygotic and dizygotic 5-year-old twin pairs in England. They found that children exposed to domestic violence scored, on average, 8 points less on an IQ test than their non-exposed siblings.

Huth-Bocks, Levendosky & Semel (2001). studied the direct and indirect effects of domestic violence on the intellectual functioning of 100 preschoolers (44 boys and 56 girls), finding that children who had witnessed domestic violence had significantly poorer verbal abilities than non-witnesses after controlling for SES and child abuse; domestic violence also indirectly affected both types of intellectual abilities through its impact on maternal depression and the intellectual quality of the home environment.

Lemmey et al. (2001) interviewed 72 mothers who were victims of intimate partner violence. Seventy-two percent reported negative behaviors on the part of their children that they believed were due to witnessing the abuse. The mothers recognized that their children could be accidentally harmed.

Descriptive studies have shown that the most common symptoms reported by children exposed to violence are allergy symptoms, symptoms of respiratory tract infections, headaches, stomach aches, gastritis, nausea, diarrhea, insomnia, nightmares, and sleepwalking (Campbell, 2002; Shannon, 2009).

Intimate partner violence places a burden on children even before they are born. Intimate partner violence does not stop during pregnancy; between 3% and 13% of pregnant women report this problem (Campbell, 2002). Intimate partner violence can affect the fetus directly and

indirectly: directly by getting injured, and indirectly by being exposed to maternal negative behaviors. Intimate partner violence predisposes pregnant women to engage in risky behaviors, such as substance abuse (Shannon, 2009). Some of the consequences for the babies include death, hemorrhages, intrauterine growth retardation, low birth weight, fetal fractures, premature delivery, and premature rupture of membranes (Huth-Bocks, Levendosky & Bogat, 2002).

2.3. Relationship between Intimate Partner Violence and Parental Harsh Discipline

The co-occurrence of different types of domestic violence in the same family has been widely documented. In particular, intimate partner violence and child abuse are often found together. One study found that about 50% of men who abuse their wives also abuse their children (Barnett et al., 2005; Radford & Hester, 2006). Children living in violent families could be affected directly by violence and indirectly by witnessing the violence, or by experiencing parenting practices disturbed by violence at home.

Parenting children in a violent environment is not an easy task, as stated by the 32 victims of intimate partner violence interviewed by Zinc, Elder & Jacobson, (2003). The nonviolent partner, usually the mother, tries to defend his/her children from the abuser. Mothers make decisions about staying or leaving the violent household for the sake of their children. Some of them cope with the problem by means of reassuring the children and trying to compensate for the bad treatment that children receive from their husbands (Radford & Hester, 2006).

Nonetheless, mothers are affected by the violence as well. Distressed mothers are more likely than their non-abused peers to show fear, high homicidal and suicidal risk, permanent physical and/or mental disability, physical injury, depression, Post- Traumatic Stress Disorder,

eating disorders, low self-confidence, and substance abuse problems. There are mothers who

cope with the problem by dissociating and pretending that the abuse has not happened, and

others who react aggressively, even with their own children (Feerick & Silverman, 2006;

Radford & Hester, 2006). Battered women are more likely to physically abuse their children and

sometimes they are unable to respond to their children's needs. It is very difficult for abused

women to discipline their children (McCue, 2008). About 50% of mothers affected by domestic

violence acknowledge parenting problems such as poor communication, harsh discipline, and

child rejection. Parenting while the victim of domestic violence is very stressful. In addition to

the physical and verbal abuse, perpetrators usually isolate women and overload them with

household responsibilities while restraining them financially (Radford & Hester, 2006).

2.4. Community Violence, Family Violence and Child Health

This section reviews existing literature on the association between community violence

and child health, both directly or through the mediation of intimate partner violence or parental

discipline practices.

The environment creates social and cultural forces that shape a person's life. Children are

highly influenced by their surroundings, including their neighborhood, city, and country of

residence. Deprived environments prevent millions of children from attaining their full potential,

particularly in the developing world (Walker et al., 2007). Community characteristics have been

associated, regardless of individual risk factors, with the incidence of disease, mortality risk, and

risky behaviors (Berkman & Kawachi, 2000; Yen & Syme, 1999).

Children exposed to domestic violence are more likely to be exposed to community

violence (Hotaling, Straus & Lincoln, 1989). Multiple exposures to violence lead to complex

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trauma and even worse effects on child health than those caused by single exposures (Hotaling et al.,1989; Zinzow et al., 2009).

Felitti et al. (1998) studied the relationship between childhood exposure to emotional, physical, or sexual abuse and risky behaviors and disease in adulthood. They mailed a questionnaire about adverse childhood experiences to 13,494 adults who had completed a standardized medical evaluation at a large HMO. They found that the greater the number of adverse exposures suffered during childhood the higher the risks for alcoholism, drug abuse, depression, suicide attempts, smoking, and more sexual intercourse partners in adulthood (Felitti et al., 1998). Of course, this study is limited by retrospective self-reporting. Individuals who have more problems as adults may tend to "overreport" problems in childhood.

2.4.1. Community Violence and Child Health

A number of studies have associated child health outcomes with the social characteristics of the broad environment, including community violence. A review of the literature found that, on average, 10% of child health outcomes are explained by the characteristics of the broad environment, after controlling for individual and family factors (Sellstrom & Bremberg, 2006). Health outcomes derived from childhood exposure to environmental factors, including violence, can extend to adulthood (Kuh et al., 2004).

Deprived environments have been linked to low birth weight (Jarvelin et al., 1997). In a cohort study of 101,662 American infants and their parents living in 343 neighborhoods (Morenoff, 2003), low birth weight was associated with higher rates of community violent crime and lower societal participation in voluntary associations. In a cohort study of 50,757 American infants living in 180 census tracts (O'Campo, Xue, Wang & Caughy, 1997), low birth weight was also associated with living in low income neighborhoods, neighborhoods with higher

unemployment rates, and those with high crime rates. Several British studies that used data from 22,552 children, including 3,944 hospitalized due to injury, also found a positive association between living in deprived neighborhoods and childhood injuries (Haynes et al., 2003; Reading et al., 1999).

Post-Traumatic Stress Disorder and other psychological injuries among children have also been associated with community violence. Using focus groups and semi-structured interviews, Tol, Reis, Susanty & de Jong (2010) studied the influence of community violence in Indonesia. The participants reported somatic symptoms as a result of their exposure to community violence.

2.4.2. Community Violence and Intimate Partner Violence

Many experts have hypothesized that community violence increases the risk of intimate partner violence (Barnett et al., 2005; Djeddah, Facchin, Ranzato & Romer, 2000; Harway & O'Neil, 1999; Sanchez & Diaz, 2007), but to the author's knowledge, only one study has actually linked intimate partner violence and community violence. Studying a sample of 50 low-income, non-shelter women from six different US states (New York, Oklahoma, Tennessee, Missouri, California, and North Carolina), Raghavan, Mennerich, Sexton & James, (2002) found that living in neighborhoods with higher levels of social disorder and substance abuse increased the women's exposure to community violence that, in turn, was associated with increased rates of intimate partner violence.

In contrast, the influence of deprived environments on intimate partner violence has been broadly studied (Barnett et al., 2005; Flowers, 2000; Gelles, 1999; Gerdes, 1999; Milner & Crouch, 1999; O'Campo et al., 1995). Deprived environments are characterized by high rates of

poverty, joblessness, residential mobility, and violence (Krivo & Peterson, 1996). In a study of 157 low-income women in Baltimore, O'Campo et al. (1995) found an association between neighborhood deprivation and intimate partner violence. A study by Cunradi Caetano & Shafer (2000)on a US national sample of 1,625 couples supported the association of neighborhood poverty and intimate partner violence. Based on 8,782 residents of 343 Chicago neighborhoods, Browning (2002) found that collective efficacy, neighborhood cohesion and informal social control capacity were protective factors against intimate partner homicide. Using a Sub-Saharan sample of 165,983 women and 68,501 men nested within 7,465 communities, Uthman, Moradi & Lawoko (2009) studied the relationship of attitudes towards domestic violence and broad environmental factors and found that neighborhood poverty was associated with tolerance toward violent behaviors. Finally, Wong, Chen, Goggins, Tang & Leung (2009) reported that low socioeconomic status and high internal migration predicted physical abuse in 6,628 Chinese highschool students .

2.4.3. Community Violence and Harsh Parental Discipline

Parents raise their children following the norms that their culture dictates. Believing that corporal punishment is necessary to control behavior leads to spanking and other types of physical punishment (Barnett et al., 2005; Summers & Hoffman, 2002).

Deprived environments usually stress parents, predisposing them to poor parenting practices. A study of 704 US preadolescents found that neighborhood poverty and violence were associated with parenting difficulties; the higher the rate of poverty and violence in the neighborhood, the more likely the use of aggressive parenting practices. Aggressive parenting, in turn, was linked to a higher incidence of child depression (Mrug & Windle, 2009).

In contrast, supportive environments decrease parental stress and may result in improved parenting practices. For instance, nurse home visits are associated with an improvement in parenting practices and, subsequently, to better child development (Howard & Brooks-Gunn, 2009). Mothers' positive perceptions of neighborhood cohesion have been associated with less hostile parenting practices (Silk, Sessa, Morris, Steinberg & Avenevoli, 2004).

2.5. Maternal Education and Child Health

Maternal education has shown a strong association with child health. Using different datasets, applying diverse research methodologies, and studying different geographical regions, most authors have concluded that the higher the mother's education, the better the health status of her offspring. This association is explained in part but not completely, by the following fators: better socioeconomic status of educated mothers,mothers who have fewer children and believe in the equitable treatment of sons and daughters, and the use of preventive and curative health services (Barrera, 1990; Boyle et al., 2006; Cleland & van Ginneken, 1988; Desai & Alva, 1998; Sastry & Pebley, 2010; Victoria, Huttly, Barros, Lombardi & Vaughan, 1992).

Desai & Alva (1998) studied the first round of Demographic and Health Surveys in 22 developing countries and found that maternal education was associated with an increase in childhood immunization rates and a decrease in infant mortality. In a cohort of 6,000 Brazilian children, Victoria et al. (1992) found that higher maternal education was associated with lower rates of perinatal and infant mortality, a lower number of hospital admissions in the first 20 months of life, and better nutritional status. These associations were explained only in part by other socioeconomic factors. Using information from the demographic and health surveys of 42

countries, Boyle et al. (2006) found that higher education levels were associated with greater returns to child health, measured by appropriate weight and height for age.

Infant mortality and child mortality are health outcomes that have shown a consistent association with maternal education (Cochrane, Leslie & O'Hara, 2004; Reed, Habicht & Niameogo, 1996). Cleland & van Ginneken (1988) were among the first to report this association; they found that, on average, each one-year increase in a mother's education was associated with a 7% to 9% reduction in risk of infant mortality.

The association of maternal education with child morbidity outcomes has not been as consistent (Cochrane et al., 2004), and seems to depend on the socioeconomic level of the family and neighborhood. The association is present when there are enough economic resources but it does not hold when these resources are not abundant (Reed et al., 1996). Studying the nutritional status of 435 children in Benin, Reed et al. (1996) even found a negative association between maternal education and child health for high income women. They speculated that this inverse association was due to the high occupational involvement of high income mothers.

Maternal education also moderates the negative effects of many risk factors on child health. Following a cohort of 96 low birth weight infants, Procianoy, Koch & Silveira (2009) found that the relationship between growth restriction and neurodevelopment delay was moderated by maternal education. The relationship disappeared if the mothers were better educated.

2.6. Other Factors Associated with Child Health

2.6.1. Child Age

Younger children are particularly vulnerable to external insults; the younger the child the more likely to get sick and die. There are three main factors that help to explain their differential

risk: 1) the biological systems of children develop such that the younger the children, the more likely to have immature structures unable to achieve their full potential; 2) the immune system generates protective antibodies with each exposure to additional microorganisms. Younger children have not had enough exposure and therefore don't have enough defenses; and 3) relative to their body mass, children breathe and drink more than adults. This gives them a greater chance to be exposed to noxious agents (Behrman RE, 2000).

2.6.2. Child Gender

Gender differences in child survival depend on the region of the world. Mortality rates are usually higher for boys than for girls, probably due to biological factors. Baby boys are more likely to suffer from congenital abnormalities and to have immune deficiencies (United Nations, 1998).

On the contrary, in Africa and Asia mortality is higher for girls. The female mortality disadvantage seems to be explained by sex-selective abortion practices, the fact that girls are fed less, and parents' behavior when a child is sick. Parents tend to buy fewer medications for girls than boys (Hill & Upchurch, 1995).

2.6.3. Vaccination

Routine vaccination has proved to be one of the most important factors in reducing infant and child mortality rates all over the world ("Monitoring the Situation of Children and Women," 2009). War areas are no exception. Studying 1,491 children in Guinea-Bissau, Aaby et al. (2002) demonstrated that vaccinated children had a greater chance of survival in war areas.

2.6.4. Health Insurance

The availability of child health insurance enables access to health services for boys and girls. Access to health services is one of the most important determinants of health (Berkman & Kawachi, 2000).

2.6.5. Maternal Age

Maternal age has been associated with health outcomes for young children in industrialized and developing countries. As examples, Pittard, Laditka & Laditka (2008) found that younger mothers used child health services more frequently than older mothers in South Carolina; this was true even after controlling for socioeconomic factors. If the greater utilization of health services serves as a proxy for poorer child health, their results suggest that children from young mothers are less healthy than those of older mothers. Of course, young mothers may simply be less experienced in determining when medical attention is needed. Using the Demographic and Health Surveys from 76 countries, Canning, Finlay & Ozaltin (2010) found that maternal age is an important determinant of child health in low and middle income countries. Children from mothers under 18 years of age are more likely to die, have lower weight and height, and suffer diarrhea and anemia than children from older mothers.

2.6.6. Maternal Employment

Maternal employment before the first year of age has detrimental effects on a child's health. Using data on 900 white children from the National Institute of Child Health and Human Development Study of Early Child Care and including characteristics of the home environment, Baydar & Brooks-Gunn, (1991) found that maternal employment was associated with lower school readiness even after controlling for quality of care. A study using data from the US National Longitudinal Survey of Youth found that mothers who returned to work within the first

12 weeks after the delivery of a baby had lower breastfeeding rates, lower child immunizations, and greater number of child behavioral problems compared with mothers who stayed home with their babies (Berger, Hill & Waldfogel, 2005).

The effects of maternal employment on child health after this initial period of life are difficult to predict. On the one hand, maternal employment raises family income and increases the probability of receiving health insurance, which in turn have been associated with better health outcomes. On the other hand, maternal employment decreases the time that mothers spend with their children, which can be detrimental to the child's health. Less time with the children could translate into less care and supervision.

2.6.7. Maternal Depression

Depressed mothers usually report poorer child health status than mothers who are not depressed (Casey et al., 2004). It is not entirely clear if the mothers get depressed due to the poor health status of their children or if they report poorer health status due to their depressed mood (Casey et al., 2004).

2.6.8. Family Wealth

Children from low income families are in worse health than children from better income families. This is true for all health outcomes that have been studied, including acute and chronic illnesses, and physical and mental diseases (Berkman & Kawachi, 2000; Currie & Wanchuan, 2007).

2.6.9. Type of Family

Children from nuclear families, living with both biological parents, are less likely to have negative health outcomes than those living in other family structures. Emotional and behavioral

problems, physical illnesses, and school failure are less likely when the children come from

nuclear families (Dawson, 1991).

2.6.10. Number of Household Members

The negative effects of overcrowding on the children's physical health are well

documented in Colombia. These negative effects seem to stay with the child until adulthood

(Office of the Colombian Deputy Prime Minister, 2004). The effect of overcrowding on

children's mental health is not as clear; the evidence shows mixed results (Office of the

Colombian Deputy Prime Minister, 2004).

2.6.11. Type of Residence

Health disparities between rural and urban areas have been documented. The health status

of people living in urban communities seems to be better than that of those living in rural regions

(Berkman & Kawachi, 2000). This is probably due to the better resources available in urban

areas (Berkman & Kawachi, 2000; Fotso, 2006).

2.6.12. Migration

Migration refers to the movement of people inside the country (Refugees International,

2007). Growing up in the same community as where one was born increases the health status of

children. Moving from one community to another one produces anxiety and triggers an acute

reaction to stress that increases the possibilities of suffering poor health, as explained by

biological stress theory (Maggi et al., 2010). Additionally, support networks are usually absent in

new communities (Maggi et al., 2010).

2.6.13. Community wealth

High area poverty rates have been positively associated with poor health outcomes

(Berkman & Kawachi, 2000; Singh et al., 2008). Although community wealth seems to play an

important factor in child health, it is not a cause of disease. There are poor communities that invest in public benefits and child health and have good health outcomes, independent of their general wealth (Miller, 1993).

The above factors that have been associated with child health may be grouped into three categories: first, those that pertain directly to the child, including the child's age, gender, vaccination history and health insurance coverage; second, those related to the child's mother, including the mother's age, employment status, and mental health; and finally, the factors that affect the whole family, including the type of family, the number of household members, the urban or rural residency, migration, and community wealth.

2.7. Colombia

This section provides an overview of some basic socioeconomic characteristics of Colombia, and reviews existing literature on community violence, domestic violence, parental discipline practices, and child health in Colombia.

Colombia is a tropical country situated in the northwest corner of South America. It has coasts on both the Caribbean and Pacific Ocean and a continental area of 1,141,748 km^2 (440,829 square miles). The longest mountain range in the world, the Andes, crosses Colombia from south to north, creating a wide range of climates; Colombia is one of the most biodiverse countries in the world.

Around half of the Colombian population lives below the poverty line. Income inequality in the country has increased during the last decade. Colombia's Gini Coefficient (0.59), which is a statistical measure of inequality in wealth distribution, places it among the ten most unequal countries in the world. Unemployment, child labor, and participation in the informal economy prevail. Minority populations, Afro-Colombians, and Indigenous peoples are discriminated

against. They are over-represented among the people living under extreme poverty and are disproportionately affected by armed conflict. They receive fewer resources from the government than the majority population, and have limited access to education, employment, social services, and health care ("Colombia," 2007; "Colombia," 2006).

Health care and educational coverage in Colombia are high when compared with other countries in the Andean region. However, both of these services have significant flaws. Only 82% of Colombian children have access to elementary and middle school. Although 91% of the population has health coverage, the quality of services provided to the low income population is very deficient. Minorities and people living in rural areas are overrepresented in the population without services (Profamilia, 2006).

2.7.1. Violence in Colombia

Unfortunately, Colombia has been a very violent society for over a hundred years. The civil wars of the first half of the 20th century and the vicious internal conflict of the second half, fueled by the illicit narcotics trade, have claimed an estimated one million lives in the country (US Department of State, 2007). This violence has led to decades of massive migration of population inside the country. According to Refugees International, "Colombia's internal displacement crisis stands as the world's worst after Sudan..." (Refugees International, 2007). Displacement has affected mainly women and children (Jennings & Birkeland, 2008; Profamilia, 2006).

The armed conflict has fed discrimination against women ("Colombia," 2007). It has promoted recruitment of children as soldiers, spies, and sexual slaves ("Colombia," 2006). The conflict has merged with other types of violence, such as domestic violence and criminal

activities, helping to normalize the use of violence in Colombia (Posada & Wainrvb, 2008). Despite significant improvements over the past 8 years, Colombia continues to exhibit some of the highest crime rates in the continent (Agrast, Botero & Ponce, 2010). Violence has limited the social and economic development of the country.

Colombia has made international commitments to protect the rights of its people, particularly those of women and children ("Colombia," 2007). The Colombian constitution and several laws protect these rights, although enforcement is deficient. Regrettably, a high rate of impunity prevails in the country. The Colombian criminal justice system seriously underperforms those of most of its income-level and regional peers (Agrast et al., 2010). Lack of reporting, corruption, and flaws in the judicial system cause over 90% of crimes in the country to go unpunished (Profamilia, 2006).

2.7.2. Domestic Violence in Colombia

As in the rest of the world, domestic violence is widespread in Colombia (Shannon, 2009; Carreno Samaniego, 2008). Some authors attribute the social violence in the country to violence experienced at home. They argue that violent people learn this behavior inside their own families (Profamilia, 2006; Sanchez, Llorente, Chaux Torres, Riberon &, 2005). The World Health Organization recognizes domestic violence in Colombia as a high-priority problem (World Health Organization, 2009).

Despite government efforts to respond to domestic violence, such as the program HazPaz (Make Peace, in English), reports of intra-family violence have increased from 1990 to 2008 (Carreno Samaniego, 2008). During 2008, the National Institute of Forensic Medicine evaluated 89,803 reports of domestic violence. Intimate partner violence was the most common type,

accounting for 67% of all reports. It is estimated that 105,069 years of healthy life were lost in 2008 due to domestic violence. Intolerance, alcohol abuse and economic factors were associated with its incidence. The family home was the most common scene of abuse (Carreno Samaniego, 2008) and women are the most common victims of domestic abuse in Colombia (78.8%), followed by children. There are only isolated reports of domestic violence against men. The worst discrimination against women in Colombia is caused by domestic violence (Carreno Samaniego, 2008).

Although there are regional variations, Colombian families tend to be patriarchal, authoritarian, closed, and very concerned with privacy. Machismo prevails, particularly in low socioeconomic segments of the society. Traditions such as a man's possession of his spouse and a woman's marital obligations, while having decreased over time, are still widely accepted (Abranzon, 2004; Betancourt, 2004).

The study of domestic violence in Colombia has been limited to documenting the cases reported to the authorities and presenting their demographic characteristics. Very few studies have explored domestic violence further. The lack of information about factors associated with domestic violence has hampered intervention efforts.

A national survey of Colombian women revealed that 66% of them are subject to excessive control, 26% are treated with disdain, 33% are threatened, and 39% are physically abused by their husbands (Profamilia, 2006). Approximately 85% of the abused women reported physical or psychological sequelae from the abuse, but only one in five consulted a health provider and only 24% reported aggression to a competent authority. Intimate partner violence was associated with low socioeconomic status and residence in rural areas. Women who have

been forced to migrate from their place of origin are particularly vulnerable to domestic violence (Profamilia, 2006).

A case control study of the cost of domestic violence in Colombia found that domestic violence caused a loss of women's earnings equivalent to 2.2% of the country's GDP, and a total loss of 3.93% of the country's GDP. Additionally it showed that households affected by domestic violence have lower incomes and higher female unemployment rates (Sanchez et al., 2005).

Finally, a study of 3,971 women using pediatric health services in Bogota showed that 26.5% reported that their current partner had slapped or pushed them, and 26.2% reported that their partner imposed some prohibition on them. Domestic violence was associated with low income, low education, a high number of children, a longer period of time living with the partner, marital conflict, and history of abuse in the family of origin (Klevens, 2001).

2.7.3. Parental Discipline Practices in Colombia.

In recent years fathers and mothers in Colombia have been changing their child rearing techniques, showing more affection and understanding to their children. Father's participation in child rearing and domestic activities has increased, and verbal communication is now considered essential in the child rearing process (Betancourt, 2004). Nevertheless, most children in Colombia are still raised following a patriarchal ideology based on fear, control, and repression (Betancourt, 2004; Carreno Samaniego, 2008). Parenting is viewed as a private matter and, therefore, abuse is under-reported and under-punished (Abranzon, 2004). Corporal punishment continues to occur in the school, at home, and in other institutions (Carreno Samaniego, 2008).

Parental discipline practices in Colombia have been influenced by factors at different environmental levels, including cultural values and beliefs, social structures, and family characteristics (Belsky, 1993). The culture in the country permits and in some cases promotes abusive child discipline and patriarchal gender roles. Aggression is permitted as a way to correct those who disobey norms. Children are viewed by many as parental possessions, and some parents believe they can do whatever they want with their own children (Abranzon, 2004; Pinzon-Rondon & Ramirez-Herrera, 2006; Ramirez-Herrera & Pinzon-Rondon AM, 2005).

The social environment is a source of stress due to generalized violence, income inequalities, high unemployment, poverty rates, migration, and lack of parental support. This stress makes parenting more difficult and predisposed to child abuse (Dulcey, Forthcoming; Pinzon-Rondon & Ramirez-Herrera, 2006; Ramirez-Herrera & Pinzon-Rondon AM, 2005; US Department of State, 2007). Some families that feel too poor to care for their children abandon them (Carreno Samaniego, 2008). The low education of many parents contributes to a generalized lack of parenting skills (Pinzon-Rondon & Ramirez-Herrera, 2006; Ramirez-Herrera & Pinzon-Rondon AM, 2005;). Physical and emotional punishments have been used for generations as necessary parenting practices to raise children adequately (Ramirez-Herrera & Pinzon-Rondon AM, 2005).

A national survey revealed that 41% of Colombian fathers use physical punishment to correct their children, while verbal scolding is used by 75% of them. Low education, low income, and living in rural areas were associated with the use of physical punishment by fathers. Regarding mothers, 47% admitted using physical punishment in raising their children – a higher percentage than that of fathers. This differential is explained by the mother's higher involvement with their children. Low education, low income, residence in rural areas, older age, cohabitation,

and new marital union were associated with the use of physical punishment by mothers (Profamilia, 2006). Fathers use physical punishment mainly on Sundays, while the use of physical punishment by mothers remains constant throughout the week. This shows that mothers interact with their children all week long while fathers do so when they are not working (Carreno Samaniego, 2008).

A case control study of 1,152 school youths and 148 juvenile offenders in Colombia found that exposure to domestic violence, mainly child abuse, predisposes children to violent behavior in adulthood (Mejia, Kliewer & Williams, 2006). Finally, a case control study in which 670 non-abusive families were compared with 166 abusive families, showed that abusive families had lower levels of community integration, lower participation in community social activities, and less use of formal and informal organizations (Gracia & Musitu, 2003).

2.7.4. Child Health in Colombia

The Colombian infant mortality rate and the under-five mortality rate, while having decreased lately, are still suboptimal. Colombia has an infant mortality rate of 18.9 deaths/1,000 live births. The under five mortality rate in the country is 21 deaths/1,000 live births, ranging from 17 in Bogotá to 29 in the coastal areas. The most prevalent health problems of children under five are chronic under-nutrition (13.5%), diarrhea (13.9%), acute respiratory infections (12.6%), and injuries (6%) (World Health Organization, 2009). These are associated with no breast feeding, low birth weight, low socioeconomic status, poor hygiene, and mother's low educational level (Caceres et al., 2005). The rate of breastfeeding in the country is low. Twenty-three percent of mothers exclusively breastfeed through the fourth month and 12% through the sixth month ("Colombia," 2006). Access to health services in the country is unequal,

discriminating against minority populations and rural residents (Attanasio, Gomez, Rojas & Vera-Hernandez, 2004).

Malnutrition in Colombia has increased recently. It disproportionately affects minority populations and displaced people (Larrea & Freire, 2002). Vitamin A and iron deficiencies are significant in the country (Maslova et al., 2009). In a 2005 study of children under five, the prevalence of chronic undernutrition was 13.5%, the prevalence of severe undernutrition was 2.8%, and the prevalence of anemia was 23% ("Colombia," 2006). Food insecurity predicts underweight (Isanaka, Mora-Plazas, Lopez-Arana, Bavlin & Villamor, 2007). Malnutrition can also be manifested as obesity. Obesity is associated with low socioeconomic status (McDonald, Bavlin, Arsenault & Villamor, 2009).

In Colombia, immunization rates have decreased lately and they remain unequal across segments of the population; minorities and low income populations show lower rates of coverage. Lack of immunization has been predicted by large family size, low parental education, and not having a regular healthcare provider (Acosta-Ramirez N, Duran-Arenas, Eslava-Rincon & Campusano-Rincon, 2005).

Other major child health concerns in the country are vertical transmission of HIV/AIDS, inequalities in access to healthcare (Nieto, Mutis, Mercer, Bonati & Choonara, 2009), mental health difficulties caused by the armed conflict (Perez-Olmos, Fernandez Pineres & Rodado-Fuentes, 2005), and the poor health status of displaced children (Caceres, Izquierdo, Mantilla, Jara & Velandia, 2002).

The ICBF (Colombian Institute for the Family Welfare) is the governmental agency responsible for the protection of families and children. It lacks stable and sufficient resources, as well as a regional presence to effectively coordinate activities ("Colombia," 2006).

2.7.5. Violence and Child Health in Colombia

Violence affects child health in Colombia directly, when children are the target of violence (Nieto et al., 2009), or when they are accidentally injured as a consequence of their proximity to conflict. The main cause of mortality in children aged 10 – 14 years and children aged 15 – 19 years in Colombia is homicide. Most of these deaths are caused by firearms (Nieto et al., 2009).

Violence also affects the mental health of children (Perez-Olmos et al., 2005) and reduces the quality of their environment (Caceres et al., 2002). A study of 493 Colombian children aged 5-14 found that children living in municipalities that had been attacked by guerrilla groups during the last year were 20 times more likely to be diagnosed with Post-Traumatic Stress Disorder than those living in peaceful municipalities (Perez-Olmos et al., 2005). Additionally, Caceres et al. found that many families affected by violence migrated to the cities and settled in dwellings lacking sanitary conditions. Caceres et al. hypothesized that this situation might lead to high rates of infectious diseases and malnutrition (Caceres et al., 2002).

The impact of different types of violence on Colombian children's health is probably shaped by certain characteristics of the Colombian context, which were highlighted above. In sum, Colombia is one of the most violent countries in the world; drug trafficking and internal armed conflict have produced one of the world's worst internal displacement crises; half of the population lives below the poverty line and income inequality is among the highest in the world. Additionally, domestic violence is widespread, although there are important regional variations. Colombian families tend to be patriarchal, authoritarian, closed and very concerned with privacy; children tend to be raised with fear, control and repression; child corporal punishment at home is prevalent, while varying in intensity by regions.

The study of the influence of violence on child health in Colombia has been very limited. The influence of community and domestic violence on child physical health is unknown.

2.8. Research Questions and Hypothesis

The following summarizes the research questions that will be investigated in this study.

2.8.1. Research Questions

a. Are harsh parental discipline practices related to the physical health of children under five years of age in Colombia?

b. Is the presence of intimate partner violence in the household associated with the physical health of children under five years of age in Colombia?

c. Is the presence of intimate partner violence related to the practice of harsh parental discipline in Colombian households?

d. Does child health vary among Colombian geographical areas (municipios)? Is child health associated with the levels of violence in the geographical area of the child's residence?

e. Are harsh parental discipline practices related to the levels of violence in the geographical area of the child's residence?

f. Is intimate partner violence related to the levels of violence in the geographical area of the child's residence?

g. Is community violence related to young children's physical health through its effect on parental discipline practices? Is community violence related to young children's physical health through its effect on intimate partner violence?

h. Does maternal education moderate the relationship between violence and children's physical health?

2.8.2. Hypotheses

Hypothesis 1: Based upon biological theory, young children whose parents did not use harsh discipline practices during the previous year are expected to be in better health than those whose parents used such practices during the same period (path a - figure 2).

Hypothesis 2: Based upon family stress theory, young children of households where intimate partner violence was absent during the previous year are expected to be in better health than those of households where intimate partner violence was present during the same period (path b – figure 2).

Hypothesis 3: Based upon family stress theory, young children of households where intimate partner violence was absent during the previous year, are expected to have experienced less parental harsh discipline than those of households where intimate partner violence was present during the same period (path c – figure 2).

Hypothesis 4: Based upon ecological theory, young children of households located in less violent geographical areas are expected to be in better health than those of households located in more violent areas (path d – figure 2).

Hypothesis 5: Consistent with ecological theory, children from households located in more violent geographical areas are more likely to experience harsh discipline than those located in less violent areas (path e – figure 2).

Hypothesis 6: Consistent with ecological theory, children from households located in more violent geographical areas are more likely to witness intimate partner violence (path f – figure 2).

Hypothesis 7: Consistent with both ecological theory and family stress theory, the associations of intimate partner violence and harsh discipline practices on child health are greater for children

from households located in more violent geographical areas than for those located in less violent areas.

Hypothesis 8: Consistent with family stress theory, maternal education moderates the relationship between violence and children's physical health. Educated mothers mitigate the relations of intimate partner violence and drastic discipline practices on child health. Maternal education is a resource for the family (paths g – figure 2).

Figure 2. Schema of Proposed Research with Paths
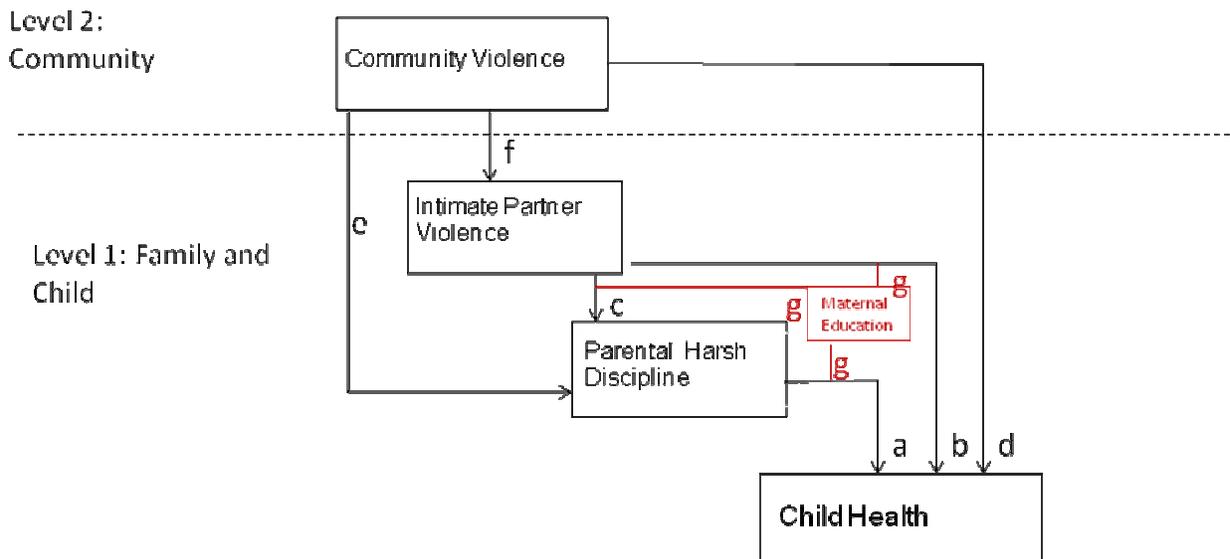
Chapter 3: Methods

Secondary data from the Colombian Demographic and Health Surveys (Profamilia, 2006) and the National Administrative Department of Statistics (DANE) (DANE, 2006) will be analyzed using multivariate and multilevel methods. This study does not include the collection of new data.

3.1. Data

Two sources of information are used: the Demographic and Health Survey (DHS) Colombia 2005 (Profamilia, 2006) for the level 1 information (child, family, and household data), and the Colombian Census 2005 (DANE, 2006) for the level 2 information (municipality data).

3.1.1. Demographic and Health Survey (DHS) Colombia 2005

The Colombian DHS 2005 is part of a worldwide initiative to collect and disseminate accurate population and health data in the developing world. In Colombia, Profamilia—a leading local NGO—has conducted four Demographic and Health Surveys (1990, 1995, 2000, and 2005) under the advice of the program MEASURE/DHS implemented by Macro International Inc., and with the support of the Colombian Institute of Family Welfare, the Colombian Ministry of Social Protection, Fundacion Corona, USAID, and UNICEF. This dataset was collected by Profamilia between October 2004 and June 2005.

Profamilia conducted two different types of surveys: household and women. The household survey collects information on the dwelling's features, the household's composition and socioeconomic situation, and some characteristics of its members. The women's survey collects information on each woman between 13 and 49 years of age, her husband or partner, and

her children under 5 years of age. It provides information on child health, intimate partner violence, parental discipline practices, and other individual characteristics such as gender, age, and education. For this study, information from the household and women surveys was merged; all women in the same household share the same household characteristics, as approximately 40% of the households had multiple eligible women.

3.1.2. Colombian Census 2005

The National Administrative Department of Statistics (DANE) is the governmental organization that collects official statistics in Colombia, including census data. The Colombian Census 2005 is the most recent census conducted in the country. It surveyed above 99.2% of the Colombian population and its census error is less than 2%. Data were collected throughout the year 2005, and included strong quality control mechanisms (DANE, 2006). They provide level 2 information, violence rate and index of quality of life per county ("municipio").

3.2. Population and Sample

3.2.1. Population

This analysis focuses on the Colombian population. The entire population of the country is represented in the Colombian DHS 2005 (Profamilia, 2006) and was surveyed in the Census 2005 (DANE, 2006).

DHS Colombia 2005 has achieved national coverage; it represents urban and rural areas, six Colombian regions (Atlántica, Oriental, Bogotá, Central, Pacífica, and Amazonía/Orinoquía), and the 33 Colombian departments - equivalent to states.

3.2.2. Sample

The sample used in this study is based on the Colombian DHS 2005 survey. The Colombian DHS 2005 survey uses a probabilistic two-stage cluster sample of the entire civil non-institutionalized population in Colombia, oversampling selected rural areas. It represents 98% of the Colombian population (Profamilia, 2006). The 41,344 women between 13 and 49 years of age who responded to the DHS' women survey were initially considered as base sample for this study. The base sample was further restricted as follows: first, to the subset of women who answered the domestic violence module (40,791); second, to those with children under five years of age (11,127); and finally, to those who answered the child subsection of the questionnaire (10,681). The study included a final sample of 10,681 children.

When women had more than one child under five years of age, only the youngest child of the family was included in the analysis. Two reasons led to the decision: first, data are more accurate for this group of children, and, second, younger children are particularly vulnerable to illness and injury.

3.3. Variables

3.3.1. Dependent Variables

Child Physical Health

In this dissertation, child health is measured as poor child health because we are interested in identifying factors that limit health and well-being. As a proxy for poor child health, the number of common infectious disease symptoms suffered by the child during the two weeks prior to the women's interview was used. Two weeks was chosen so that exposure to violence would generally precede resultant physical health consequences. The short time period also facilitates recall.

Items from the household survey and the women's survey were included to study child physical health. Certain items from the household survey were excluded because the questions were open-ended and not targeted to the children (e.g. Has anyone in this household been hospitalized during the last year? Or injured?), they were answered by any individual from the household and not necessarily the mothers, and their frequencies for children under five years of age were under 1%.

The women's survey asked questions about different symptoms suffered by the children during the last two weeks before the interview: diarrhea, fever, cough, runny nose, sore throat, general soreness, difficulties swallowing, fast breathing, chest moving differently, sunken eyes, bluish lips and fingernails, and vomiting. The dataset reports the presence or absence of the symptom. A principal components factor analysis including all these symptoms was used to create the child physical health variables for analysis using Eigenvalues greater than one and an Oblimin rotation (see factor analysis in appendix 1). The factor analysis showed the presence of three different components: upper respiratory infections, gastrointestinal infections, and serious infections. Standardized individual scores on these three factors were saved as separate variables.

Upper respiratory infections included fever, cough, runny nose, sore throat, difficulty swallowing, and general soreness. *Gastrointestinal infections* included fever, diarrhea, and vomit, and *Serious infections* included fast breathing, chest moving differently, sunken eyes, and bluish lips or fingernails. All three variables follow a Poisson distribution.

The first data analyses for the paper were conducted using these variables as dependent variables. Considering that these variables were highly correlated (upper respiratory infections and gastrointestinal infections correlation =0.27 p<.001, upper respiratory infections and serious infections correlation=0.33 p<.001, gastrointestinal infections and serious infections

correlation=0.25 p<.001) and that they shared similar correlations with the rest of the variables in the model (See appendix 2), a single index of child health was also created.

- Poor Child health: Sum of all the symptoms suffered by each child in the last 2 weeks. A weight of 2 was given to the symptoms representing serious infections because the presence of these symptoms shows a more severe physical health problem. This variable follows a Poisson distribution.

3.3.2. Level 1 - Independent Variables

Parental Harsh Discipline

The women's survey asked questions about the different ways in which parents discipline their children. The dataset includes three different variables that contain dichotomous (yes/no) information on child physical disciplinary practices used in the household during the last 12 months – spanking, pushing and hitting with objects. Taking into consideration that spanking is a disciplinary practice used by many parents to punish their children and is generally not considered abuse, this variable was eliminated.

- Harsh Discipline: Parents in the household pushed or hit their children with an object as a way to punish them during the last 12 months. No=0 and Yes=1.

Intimate partner violence

The women's survey asked questions about intimate partner violence against females in the last year. It included the following 20 items that provide dichotomous information (yes/no): accused of not being faithful, not allowed to see friends, limited contact with family, the man wanted to know where the woman was at all times, controlled the way she spent money, used expressions such as you are good for nothing, threatened with abandonment, threatened with

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taking away children, ignored, threatened with withdrawal of economic support, pushed/shook, hit with hand, hit with an object, bit, kicked/dragged, threatened with knife/gun/other weapon, attacked with knife/gun/other weapon, tried to strangle, burned, or used physical force for unwanted sex act.

A principal components factor analysis including all these items was used to create the intimate partner violence variables for analysis. The criteria for the analysis were two components and Varimax rotation (see factor analysis in appendix 3). The scores of the analysis were saved as variables: emotional intimate partner violence and physical intimate partner violence. Emotional intimate partner violence includes accusations of not being faithful, not allowed to see friends, limited contact with family, the man wanted to know where the woman was at all times, controlled the way she spent money, used expressions like "You are good for nothing", threatened with abandonment, threatened with taking away children, ignored, and threatened with withdrawal of economic support. Physical intimate partner violence includes pushed/shook, hit with hand, hit with an object, bit, kicked/dragged, threatened with knife/gun/other weapon, attacked with knife/gun/other weapon, tried to strangle, burned, and used physical force for unwanted sex act. Both variables follow a Poisson distribution. Considering that the variables were highly correlated (correlation 0.20 p<.05) and that they shared similar correlations with the rest of the variables in the model, a single indicator of domestic violence was created.

- Intimate Partner Violence: Presence of any kind of intimate partner violence during the last year (accused of not being faithful, didn't allow to see friends, limited contact with family, wanted to know where she was at all times, controlled the way she spent money, used expressions such as you are good for nothing, threatened with

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abandonment, threatened with taking away children, ignored, threatened with

withdrawal of economic support, pushed/shook, hit with hand, hit with an object, bit,

kicked/dragged, threatened with knife/gun/other weapon, attacked with

knife/gun/other weapon, tried to strangle, burned, and used physical force for

unwanted sex act). No=0 and Yes=1.

3.3.3. Level 2 - Independent Variables

Community Violence

The information for this variable comes from the Colombia Census 2005. The variable

portrays the levels of violence present in Colombian municipalities. Initially, the rate of

intentional deaths was calculated for each municipality by adding the number of homicides and

suicides and dividing this number by the total population in that municipality. This variable

followed a Poisson distribution. It was then dichotomized.

- Violent Community: Municipalities in the top 40% of intentional deaths rates. A cutoff of
  1.2 was chosen after studying the histogram of the original variable (See Appendix 4).
  Not violent community=0 and violent community=1

3.3.4. Moderator

Maternal Education

This variable comes from the Colombian DHS 2005 women's questionnaire.

- Maternal education is measured by the number of years of education that a mother has had.

3.3.5. Level 1 – Control Variables

These variables come from the Colombian DHS 2005. They were divided into child characteristics, family characteristics, and environmental characteristics.

Child Characteristics:

- Child Sex: This variable tells the gender of the child and it is coded as: girl=0 and boy=1.

- Child Age: It presents the age of the child in months.

- Child Health Insurance: This is coded by whether the child has any health insurance coverage. It is coded as: Health coverage=1 and No health coverage=0.

- Child Complete Vaccinations: This variable indicates the completeness of the basic vaccination scheme offered for free by the government to all children under 5 years of age. It was calculated taking into account the number and types of vaccines that had been given to the child and his/her age in months. Complete vaccinations=1 and No complete vaccinations=0.

Mother's Characteristics:

- Maternal Age: This is the mother's age in years.

- Maternal Occupation: This variable represents the mother's employment status and it is coded as: employed=1 and not employed=0.

- Maternal Depression: This variable summarizes the three items of the survey that refer to maternal depression: 1) had thoughts of committing suicide, 2) felt that she was worth

nothing, and 3) considered that her sad feelings affect relation to children. The presence of any of these symptoms was considered to indicate maternal depression. No depression=0 and Depression=1.

Family's Characteristics:

- Type of family: Compares nuclear families (two parents) with other types of families. It is coded as: nuclear=1 and other=0.

- Number of people living in the household: Represents the number of people living in the household.

- DHS Wealth Index: This is a measure created by the World Bank and Macro International to systematically determine a household's relative economic status (Gwatkin, Rutstein, Johnson, Pande & Wagstaff, 2000; Rutstein & Johnson, 2004). It gives each household a score based on a principal component analysis of income, availability and quality of utilities, number of rooms, dwelling materials, type of cooking fuel, and availability of durable consumer goods.

- Migration: This variable indicates whether the family has moved in the last 5 years. It is coded as: Moved=1 and Not moved=0.

- Place of residence: This variable indicates whether the household is located in an urban or a rural area. It is coded as: Urban=1 and Rural=0.

3.3.6. Level 2 –Control Variable

This variable comes from the Colombian Census 2005

- Satisfaction of basic needs: This is an area measure calculated by DANE based on the average income of the municipality, average availability and quality of utilities, average number of rooms, and average building materials of the dwellings.

3.4. Management of Missing Data

There was missing information on five independent variables, the three measuring parental discipline practices (1,301 cases missing – equivalent to 12% of the study population) and the two measuring interpersonal partner violence (848 cases missing – equivalent to 8% of the study population). A missing data analysis was conducted. It was found that the cases were not missing at random; missing information was related to other variables considered in the study. For this reason, the missing cases were imputed using the expectation maximization software EM in SPSS 18.0. All the other variables in the model were used for the imputation, which was based on a tolerance of 0.001, a convergence of 0.0001, and took 25 iterations to converge.

3.5. Data Analysis

Although p<.05 is the standard criterion for statistical significance, associations at the p<.10 level were marked, considering findings at the "trend level" or of "marginal significance" help in interpreting the results, particularly in the multilevel models.

3.5.1. Descriptive

The descriptive statistics of the variables in the model were calculated using SPSS 18.0 and HLM 6. For continuous variables the minimum, maximum, mean and standard deviations were computed, and for dummy variables the proportion was estimated.

3.5.2. Bivariate Correlations

Bivariate correlations of all the level 1 variables in the models were obtained using SPSS 18.0.

3.5.3. Regression of Child Health on Parental Harsh Discipline

A generalized linear model for Poisson-distributed variables was performed using the statistical software SPSS 18.0 to study the association of parental harsh discipline with poor child health.

- Step 1. "Poor Child Health" was regressed on "Harsh Discipline."

- Step 2. The child's characteristics were added (sex, age, health coverage, and vaccines).

- Step 3. The mother's characteristics were added (maternal age, maternal occupation, maternal education, and maternal depression).

- Step 4. Family characteristics were added (type of family, number of people living in the household, DHS wealth index, migration, and place of residence).

- Step 5. The moderation effect of maternal education was tested as an interaction with each measure of violence/abuse.

3.5.4. Regression of Poor Child Health on Intimate Partner Violence

A generalized linear model for Poisson-distributed variables was performed using the statistical software SPSS 18.0 to study the association of intimate partner violence with poor child health.

- Step 1. "Poor Child Health" was regressed on "Intimate Partner Violence."

- Step 2. The child's characteristics were added (sex, age, health coverage, and vaccines).

- Step 3. The mother's characteristics were added (maternal age, maternal occupation, maternal education, and maternal depression).

- Step 4. Family characteristics were added (type of family, number of people living in the household, DHS wealth index, migration, and place of residence).

- Step 5. The moderation effect of maternal education was tested as an interaction with each measure of violence/abuse.

3.5.5. Regression of Parental Harsh Discipline on Intimate Partner Violence

A logistic regression was performed using the statistical software SPSS 18.0 to study the association of intimate partner violence with harsh discipline.

- Step 1. "Harsh Discipline" was regressed on "Intimate Partner Violence."

- Step 2. The child's characteristics were added (sex, age, health coverage, and vaccines).

- Step 3. The mother's characteristics were added (maternal age, maternal occupation, maternal education, and maternal depression).

- Step 4. Family characteristics were added (type of family, number of people living in the household, DHS wealth index, migration, and place of residence).

- Step 5. The moderation effect of maternal education was tested as an interaction with each measure of violence/abuse.

3.5.6. Regression of Poor Child Health on Harsh Discipline and Intimate Partner Violence

A generalized linear model for Poisson-distributed variables was performed using the statistical software SPSS 18.0 to study the association of harsh discipline and intimate partner violence with poor child health.

- Step 1. "Poor Child Health" was regressed on "Harsh Discipline" and "Intimate Partner Violence."

- Step 2. The child's characteristics were added (sex, age, health coverage, and vaccines).

- Step 3. The mother's characteristics were added (maternal age, maternal occupation, maternal education, and maternal depression).

- Step 4. Family characteristics were added (type of family, number of people living in the household, DHS wealth index, migration, and place of residence).

3.5.7. Multilevel Analysis of Poor Child Health on Community Violence

Children and families are nested in municipalities. The hierarchical nature of this data requires multilevel methods for the analysis. A multilevel analysis will disentangle the effects of children and family characteristics (within-groups) from those properties of the municipalities (between-groups), avoiding individual and ecological fallacies. The use of traditional linear regression models for analysis would be insufficient because the hierarchical nature of data violates the assumptions of independence and homogeneity of variance required to apply them (Sellstrom & Bremberg, 2006).

A hierarchical linear model for Poisson-distributed variables was performed using the statistical software HLM 6 to study the association of community violence with poor child health.

- Step 1. "Poor Child Health" was regressed on "Community Violence."

- Step 2. Unsatisfied basic needs was added.

- Step 3. The child's characteristics were added (sex, age, health coverage, and vaccines).

- Step 4. The mother's characteristics were added (maternal age, maternal occupation, maternal education, and maternal depression).

- Step 5. Family characteristics were added (type of family, number of people living in the household, DHS wealth index, migration, and place of residence).

3.5.8. Multilevel Analysis of Harsh Discipline on Community Violence

A hierarchical linear model for dichotomous variables was performed using the statistical software HLM 6 to study the association of community violence with parental harsh discipline.

- Step 1. "Harsh Discipline" was regressed on "Community Violence."

- Step 2. Unsatisfied basic needs was added.

- Step 3. The child's characteristics were added (sex, age, health coverage, and vaccines).

- Step 4. The mother's characteristics were added (maternal age, maternal occupation, maternal education, and maternal depression).

- Step 5. Family characteristics were added (type of family, number of people living in the household, DHS wealth index, migration, and place of residence).

3.5.9. Multilevel Analysis of Intimate Partner Violence on Community Violence

A hierarchical linear model for dichotomous variables was performed using the statistical software HLM 6 to study the association of community violence with intimate partner violence.

- Step 1. "Intimate Partner Violence" was regressed on "Community Violence."

- Step 2. Unsatisfied basic needs was added.

- Step 3. The child's characteristics were added (sex, age, health coverage, and vaccines).

- Step 4. The mother's characteristics were added (maternal age, maternal occupation, maternal education, and maternal depression).

- Step 5. Family characteristics were added (type of family, number of people living in the household, DHS wealth index, migration, and place of residence).

3.5.10. Modeling of Poor Child Health, Parental Harsh Discipline, Intimate Partner Violence and Community Violence

Hierarchical linear models for Poisson-distributed variables were performed using the statistical software HLM 6 to study the association of harsh discipline, intimate partner violence and community violence with poor child health. First a within-families model was developed:

- Step 1. Poor child health was regressed on harsh discipline (group mean centered - free variance) and intimate partner violence (group mean centered - free variance).

- Step 2. The child's characteristics, grand mean centered and with fixed variances, were added (sex, age, health coverage, and vaccines).

- Step 3. The mother's characteristics, grand mean centered and with fixed variances, were added (maternal age, maternal occupation, maternal education, and maternal depression).

- Step 4. Family characteristics, grand mean centered and with fixed variances, were added (type of family, number of people living in the household, DHS wealth index, migration, and place of residence).

Second, a model to find the association of community violence with poor child health and the influence of community violence on the association of harsh discipline and intimate partner violence with poor child health was created:

- Step 5. Community violence was added to the intercept equation and to the slopes of harsh discipline and intimate partner violence.

- Step 6. Unsatisfied basic needs was added as a control variable to the intercept equation and to the slopes of harsh discipline and intimate partner violence.

The level 1 and level 2 equations are presented below to facilitate the interpretation of the models.

Level-1 Model
$\log[L] = B0 + B1*(\text{Harsh Discipline}) + B2*(\text{Intimate Partner Violence}) + B3*(\text{Child Age}) + B4*(\text{Child Sex}) + B5*(\text{Child Health Insurance}) + B6*(\text{Child Complete Vaccines}) + B7*(\text{Maternal Education}) + B8*(\text{Maternal Age}) + B9*(\text{Maternal Work Status}) + B10*(\text{Maternal Depression}) + B11*(\text{Number of Household Members}) + B12*(\text{Type of Family}) + B13*(\text{Household Wealth Index}) + B14*(\text{Migration}) + B15*(\text{Type of Residence}) + r$

Level-2 Model
$B0 = G00 + G01(\text{Community Violence}) + G02*(\text{Unsatisfied Basic Needs}) + U0$
$B1 = G10 + G11*(\text{Community Violence}) + G12*(\text{Unsatisfied Basic Needs}) + U1$
$B2 = G20 + G21*(\text{Community Violence}) + G22*(\text{Unsatisfied Basic Needs}) + U2$
$B3 = G30$
$B4 = G40$
$B5 = G50$
$B6 = G60$
$B7 = G70$
$B8 = G80$
$B9 = G90$
$B10 = G100$
$B11 = G110$
$B12 = G120$
$B13 = G130$

B14 = G140
B15 = G150

3.5.11. Weights

Weights, single level analysis: weights provided by the DHS for women with children under five years of age who answered the domestic violence survey were utilized in the analysis.

Weights, multilevel analysis: Level 2: They are the aggregation (mean) of the weights from all the households in each municipalities, and Level 1: Weights provided by the DHS for women with children under five years of age who answered the domestic violence survey divided by the level 2 weights.

This makes the results representative of women with children under five years of age in Colombia in 2005.

3.6. Human Subjects Considerations

This project is based completely on secondary data analysis. None of the datasets contains identifying information. It was deemed exempt by the Institutional Review Board of the University of Maryland (See Appendix 5).

Chapter 4: Results

4.1. Descriptive Analysis

A total of 10,681 children under five years of age from 230 municipalities were included in the analyses. Table 1 summarizes the characteristics of the children included in the study, the attributes of their mothers and families, the children's health status, the presence of harsh discipline and intimate partner violence in their households, the average unsatisfied basic needs of the municipalities where they live, and the presence of violence at the municipality level.

The children were on average 26 months of age. There were an equal number of boys and girls. Most of them had health insurance coverage (95%) but only 23% had a complete vaccination history (See Table 1).

The mothers were, on average, 28 years old. They had a mean of 8 years of education (around middle school attainment). Only 45% of them were employed and 11% reported symptoms of depression (See Table 1).

Nuclear families comprised 45% of the sample. Recent migration was reported by 22% of the families. The average number of household members was six and most of the families lived in urban areas (71%) (See Table 1).

Mothers reported an average of 2.2 symptoms suffered by their children during the two weeks preceding the survey. Harsh discipline, defined as pushing or hitting the kids with objects, was practiced by 42% of the families, and 18% of the mothers reported intimate partner violence (See Table 1).

Table 1. Descriptive Statistics of Variables in the Models					
Variable	N	Minimum	Maximum	Mean	SD
Poor Child Health (# of Symptoms)	10681	.00	17.00	2.22	2.74
Harsh Discipline	10681	.00	1.00	.42	
Intimate Partner Violence	10681	.00	1.00	.18	
Child Age (in Months)	10681	.00	59.00	26.33	16.88
Child Sex (Boys=1)	10681	.00	1.00	.50	
Child Health Insurance	10681	.00	1.00	.95	
Child Complete Vaccines	10681	.00	1.00	.23	
Maternal Education (# of Years)	10681	.00	23.00	7.96	4.11
Maternal Age (in Years)	10681	13.00	49.00	27.88	6.91
Maternal Work Status (Works=1)	10681	.00	1.00	.45	
Maternal Depression	10681	.00	1.00	.11	
Number of Household Members	10681	2.00	20.00	5.69	2.49
Type of family (Nuclear=1)	10681	.00	1.00	.45	
Household Wealth Index	10681	-2.50	2.76	.00	1.00
Migration	10681	.00	1.00	.22	
Type of Residence (Urban=1)	10681	.00	1.00	.71	
Community Violence	230	.00	1.00	.44	
Unsatisfied Basic Needs	230	5.43	100.00	40.32	21.18

At the municipality level, the level of unsatisfied basic needs ranged from 5% to 100%
with a mean of 40%. High levels of violence were present in 44% of the municipalities (See
Table 1).

4.2. Bivariate Correlations

The bivariate correlations of the level 1 variables considered in this study are presented in
Table 2. They show how poor child health was positively associated with harsh discipline,
intimate partner violence, sex (boys having more symptoms than girls), maternal work status
(employed mothers having children with more symptoms than non-employed mothers), maternal
depression, and the number of household members. Poor child health was negatively associated
with child age, maternal education, maternal age, type of family (children from nuclear families
having fewer symptoms than those from nonnuclear family structures), household wealth, and

type of residence (children from urban areas having fewer symptoms than those from rural areas).

Table 2 further reveals that harsh discipline was positively associated with intimate partner violence, child age, child sex (boys were more likely to receive this type of punishment than girls), maternal age, maternal work status (employed mothers were more likely to dispense this type of punishment than non-employed mothers), maternal depression, number of household members, and type of family (children in nuclear families were more likely to experience parental harsh discipline than those from other family structures). In contrast, harsh discipline was negatively associated with maternal education, household wealth, and type of residence (this type of punishment was more common in rural areas than in urban areas).

Intimate partner violence was positively associated with child age, child sex (boys were more likely than girls to live in families reporting intimate partner violence), maternal work status (employed mothers were more likely to report intimate partner violence than non-employed mothers), maternal depression, and migration (migrants were more likely to report intimate partner violence than non-migrants). In contrast, intimate partner violence was negatively associated with completeness of vaccination history (children with complete vaccination histories were less likely to live in households reporting intimate partner violence than those with incomplete histories), maternal education, and maternal age.

Table 2. Correlation of Level 1 Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Poor Child Health (# of Symptoms)	1														
2 Harsh Discipline	.040 ***	1													
3 Intimate Partner Violence	.096 ***	.107 ***	1												
4 Child Age (in Months)	-.028 **	.197 ***	.043 ***	1											
5 Child Sex (Boys=1)	.020 *	.040 ***	.024 *	.010	1										
6 Child Health Insurance	.005	-.016	-.013	.028 **	.017 †	1									
7 Child Complete Vaccines	-.010	.001	-.022 *	.102 ***	-.002	.120 ***	1								
8 Maternal Education (# of Years)	-.068 ***	-.188 ***	-.096 ***	.024 *	.001	.134 ***	.065 ***	1							
9 Maternal Age (in Years)	-.030 **	.246 ***	-.026 **	.283 ***	.000	.020 *	.013	-.048 ***	1						
10 Maternal Work Status (Works=1)	.018 †	.037 ***	.037 ***	.179 ***	.004	.048 ***	.002	.186 ***	.198 ***	1					
11 Maternal Depression	.095 ***	.129 ***	.428 ***	.060 ***	.023 *	-.024 *	-.021 *	-.096 ***	.047 ***	.027 **	1				
12 Number of Household Members	.058 ***	.070 ***	.012	-.079 ***	.000	-.054 ***	-.036 ***	-.169 ***	.045 ***	-.045 ***	.018 †	1			
13 Type of family (Nuclear=1)	-.028 **	.089 ***	-.001	.027 **	.000	.006	-.005	-.062 ***	.133 ***	-.052 ***	-.003	-.418 ***	1		
14 Household Wealth Index	-.036 ***	-.022 *	-.008	.008	.000	.026 **	-.012	.033 **	-.010	-.010	.016	-.020 *	-.013	1	
15 Migration	.014	-.002	.044 ***	-.064 ***	.007	-.070	-.014	-.020 *	-.111 ***	-.073 ***	.019 *	-.032 **	.001	.022 *	1
16 Type of Residence (Urban=1)	-.035 ***	-.086 ***	.000	.050 ***	-.007	.100 ***	.071 ***	.383 ***	.005	.121 ***	.013	-.069 ***	-.067 ***	.032 **	-.006

*** p<.001, **p<.01, *p<.05, †<.10

4.3. Poisson Regression of Child Health on Parental Harsh Discipline

In all the Poisson regression models predicting poor child health, harsh discipline was statistically significant. Harsh parental discipline predicted poor child health by itself (Model 1 in Table 3) and remained as a significant predictor of poor child health after controlling for child characteristics (Model 2 in Table 3), maternal characteristics (Model 3 in Table 3), and family characteristics (Model 4 in Table 3). The regression coefficient and the significance level decreased (4%) after adding maternal characteristics and family characteristics to the model. The final model shows how harsh discipline increased the number of children's disease symptoms reported by the mothers. The expected increase in poor health symptom count for using harsh discipline was 0.07 (OR=1.08). This translates to families who used harsh physical discipline having children with about 8% more symptoms of poor health than those who didn't use such punitive practices (See Table 3).

The child characteristics that predicted child health were child age, child sex, and child health insurance. Child age was the only child characteristic that predicted child health in all the models. Each additional month of child age decreased the number of child health symptoms by 0.2%. Table 3 only presents values with 2 decimal points. The precise regression coefficient for child age in Model 4 was -0.0019 (OR=0.998). Child sex presented a trend with a p less than .10 in Model 2 (boys had 4% more symptoms than girls). This significance disappeared after adding the maternal and family characteristics to the model. Child health insurance presented a trend with a p less than .10 in Model 4; children with health insurance had 11% more symptoms than those without health insurance, regression coefficient 0.11 (OR=1.11). A child having complete vaccinations was not a predictor of child health in these models.

All maternal characteristics predicted child health in both models at a significance level of less than 0.001. Maternal education improved child health. Each additional year of maternal

education decreased the number of child symptoms by 1.5%, regression coefficient -0.015 (OR=0.985). Maternal age improved child health as well. Each additional year of maternal age decreased the number of child symptoms by 1%, regression coefficient -0.009 (OR=0.991). Maternal employment decreased the health of children, increasing the number of symptoms suffered by the children. Working mothers had children with an average of 10% more symptoms, regression coefficient 0.09 (OR=1.10), than children of nonworking mothers. Finally, maternal depression decreased the health status of the children. Depressed mothers had children with an average of 36% more symptoms, regression coefficient 0.31 (OR=1.36), than children of nondepressed mothers.

The family characteristics that predicted child health were number of household members and household wealth index. For each additional household member children had on average 2% more symptoms, regression coefficient 0.02 (OR=1.02). Household wealth increased the health of children. For each additional standard deviation of the wealth index children had on average 5% fewer symptoms, regression coefficient -0.05 (OR=0.95). Type of residence, type of family, and migration failed to predict the health status of children in these models.

Table 3. Poisson Regression of Poor Child Health on Harsh Discipline															
	Model 1				Model 2				Model 3				Model 4			
	B a	SE b	OR c	P d	B a	SE b	OR c	P d	B a	SE b	OR c	P d	B a	SE b	OR c	P d
(Intercept)	0.75	0.02	2.12	***	0.75	0.06	2.12	***	1.01	0.07	2.76	***	0.89	0.08	2.43	***
Harsh Discipline	0.10	0.02	1.10	***	0.11	0.02	1.12	***	0.08	0.03	1.08	**	0.07	0.03	1.08	**
Child Age (in Months)					0.00	0.00	1.00	***	0.00	0.00	1.00	**	0.00	0.00	1.00	**
Child Sex (Boys=1)					0.04	0.02	1.04	†	0.04	0.02	1.04		0.04	0.02	1.04	
Child Health Insurance					0.05	0.06	1.05		0.09	0.06	1.09		0.11	0.06	1.11	†
Child Complete Vaccines					-0.02	0.03	0.98		0.00	0.03	1.00		0.00	0.03	1.00	
Maternal Education (# of Years)									-0.02	0.00	0.98	***	-0.01	0.00	0.99	***
Maternal Age (in Years)									-0.01	0.00	0.99	***	-0.01	0.00	0.99	***
Maternal Work Status (Works=1)									0.09	0.02	1.10	***	0.10	0.02	1.10	***
Maternal Depression									0.31	0.04	1.36	***	0.31	0.04	1.36	***
Number of Household Members													0.02	0.01	1.02	***
Type of family (Nuclear=1)													-0.03	0.03	0.97	
Household Wealth Index													-0.05	0.01	0.95	***
Migration													0.02	0.03	1.02	
Type of Residence (Urban=1)													-0.04	0.03	0.96	
Goodness of Fit	Value				Value				Value				Value			
Log Likelihood	-27574.14				-27543.38				-27305.80				-27234.66			
Akaike's Information Criterion (AIC)	55152.28				55098.75				54631.59				54499.32			
Bayesian Information Criterion (BIC)	55166.89				55142.59				54704.65				54608.90			

*** p<.001, **p<.01, *p<.05, †<.10
a Regression coefficient
b Standard error
c Odds ratio
d Two-tailed test

The goodness of fit shows how the inclusion of the control variables improves the model, as shown by the decline in the log likelihood (See Table 3).

The test for maternal education as a moderator of the relationship between poor child health and severe punishing practices (not shown) was negative. The interaction term was not significant. Therefore, maternal education did not moderate the relationship between child health and severe physical punishing practices.

4.4. Poisson Regression of Poor Child Health on Intimate Partner Violence

In all the Poisson regression models predicting poor child health, intimate partner violence was statistically significant. Intimate partner violence predicted poor child health by itself (Model 1 in Table 4) and remained a significant predictor of poor child health after

controlling for child characteristics (Model 2 in Table 4), maternal characteristics (Model 3 in Table 4), and family characteristics (Model 4 in Table 4) . The regression coefficient decreased (13%) after adding maternal characteristics to the model but the significance level stayed constant until the final model. Model 4 in Table 4 shows how intimate partner violence increased the number of children's symptoms reported by the mothers. The expected increase in count of symptoms for children in families experiencing intimate partner violence compared with those in families who did not was 0.18 (OR=1.20). Families who experienced intimate partner violence had children with about 20% more symptoms than those who did not experience this violence (See Table 4).

The child characteristics that predicted child health were as follows: child age, child sex and child health insurance. Child age was the only child characteristic that predicted child health in all the models. Each additional month of child age decreased the number of child health symptoms by 0.2%. Table 4 only presents values with 2 decimal points. The precise regression coefficient for child age in Model 4 was -0.0018 (OR=0.998). Child sex presented a trend with a significant less than .10 in Models 2 and 3 (boys had 4% more symptoms than girls). Child sex was no longer significant after adding the family characteristics to the model. Child health insurance was significant at less than the .10 level in Model 4. Children with health insurance had 11% more symptoms than those without health insurance. The expected log count symptom increase was 0.11 (OR=1.11) for those having health insurance compared with those who did not. Complete vaccinations for a child was not a predictor of child health in these models.

All maternal characteristics predicted child health in both models at a significance level of less than .001. Maternal education improved child health. Each additional year of maternal education decreased the number of child symptoms by 1.5%, regression coefficient -0.015 (OR=0.985). Maternal age improved child health as well. Each additional year of maternal age decreased the number of child symptoms by 0.7%, regression coefficient -0.007 (OR=0.993).

Maternal employment decreased the health of children. Maternal work status increased the number of symptoms suffered by the children. Children with working mothers had an average of 9% more symptoms, regression coefficient 0.09 (OR=1.09) than children of nonworking mothers. Finally, maternal depression decreased the health status of the children. Children with depressed mothers had an average of 25% more symptoms, regression coefficient 0.22 (OR=1.25) than children of nondepressed mothers.

The family characteristics that predicted child health were as follows: the number of household members, the household wealth index, and the type of residence. For each additional household member children had on average 2% more symptoms, regression coefficient 0.02 (OR=1.02). Household wealth increased the health of children. For each additional standard deviation of the wealth index, children had, on average, 5% fewer symptoms, regression coefficient -0.05 (OR=0.95). Living in urban areas presented a trend predictive of better child health at a significance level of less than .10. Children living in urban areas have on average 5% fewer symptoms than those living in urban areas -0.05 (OR=0.95). Type of family and migration failed to predict the health status of children in these models.

Table 4. Poisson Regression of Poor Child Health on Intimate Partner Violence																
	Model 1				Model 2				Model 3				Model 4			
	B a	SE b	OR c	P d	B a	SE b	OR c	P d	B a	SE b	OR c	P d	B a	SE b	OR c	P d
(Intercept)	0.74	0.01	2.09	***	0.73	0.06	2.08	***	0.97	0.07	2.64	***	0.84	0.08	2.32	***
Intimate Partner Violence(IPV)	0.28	0.03	1.33	***	0.29	0.03	1.33	***	0.18	0.03	1.20	***	0.18	0.03	1.20	***
Child Age (in Months)					0.00	0.00	1.00	**	0.00	0.00	1.00	**	0.00	0.00	1.00	*
Child Sex (Boys=1)					0.04	0.02	1.04	†	0.04	0.02	1.04	†	0.04	0.02	1.04	
Child Health Insurance					0.05	0.06	1.05		0.09	0.06	1.09		0.11	0.06	1.11	†
Child Complete Vaccines					-0.01	0.03	0.99		0.00	0.03	1.00		0.00	0.03	1.00	
Maternal Education (# of Years)									-0.02	0.00	0.98	***	-0.01	0.00	0.99	***
Maternal Age (in Years)									-0.01	0.00	0.99	***	-0.01	0.00	0.99	***
Maternal Work Status (Works=1)									0.09	0.02	1.09	***	0.09	0.02	1.09	***
Maternal Depression									0.22	0.04	1.25	***	0.22	0.04	1.25	***
Number of Household Members													0.02	0.01	1.02	***
Type of family (Nuclear=1)													-0.02	0.03	0.98	
Household Wealth Index													-0.05	0.01	0.95	***
Migration													0.02	0.03	1.02	
Type of Residence (Urban=1)													-0.05	0.03	0.95	†
Goodness of Fit	Value				Value				Value				Value			
Log Likelihood	-27438.38				-27413.05				-27269.53				-27196.17			
Akaike's Information Criterion (AIC)	54880.76				54838.09				54559.06				54422.34			
Bayesian Information Criterion (BIC)	54895.37				54881.93				54632.12				54531.93			
*** p<.001, **p<.01, *p<.05, †<.10																
a Regression coefficient																
b Standard error																
c Odds ratio																
d Two-tailed test																

The goodness of fit shows how the inclusion of the control variables improves the model, as shown by the decline in the log likelihood (See Table 4).

The test for maternal education as a moderator of the relationship between poor child health and intimate partner violence (not shown) was negative. The interaction term was not significant. Therefore, maternal education did not moderate the relationship between child health and intimate partner violence.

4.5. Logistic Regression of Parental Harsh Discipline on Intimate Partner Violence

In all the logistic regression models predicting harsh discipline, intimate partner violence was statistically significant. Intimate partner violence predicted harsh discipline by itself (Model 1 in Table 5) and remained a significant predictor of harsh discipline after controlling for child characteristics (Model 2 in Table 5), maternal characteristics (Model 3 in Table 5), and family

characteristics (Model 4 in Table 5) . The regression coefficient decreased (26%) after adding

maternal characteristics to the model but the significance level stayed constant in the final model.

Model 4 in Table 5 shows how intimate partner violence increased the probability of using harsh

discipline in the household. The regression coefficient was 0.34 (OR=1.41). This translates to

families who experienced intimate partner violence being 40% more likely to use harsh

discipline than those who did not experience this violence.

The child characteristics that predicted harsh discipline were: child age, child sex and

child health insurance. Child age and child sex predicted harsh discipline in all the models with a

level of significance of less than .001. For each additional month of child age there was an

increase in the probability of harsh discipline of 18%, regression coefficient 0.16 (OR=1.18).

Boys were 2% more likely than girls to live in families that practiced harsh physical discipline,

regression coefficient 0.02, (OR=1.02). Child health insurance predicted harsh discipline only in

the first model with a trend, significance level of less than .10. This significance disappeared

after controlling for maternal and family factors and the regression coefficient changed from

negative to positive. A child's complete vaccination history was not a predictor of harsh

discipline in these models.

The maternal characteristics that predicted harsh discipline were maternal education,

maternal age, and maternal depression. All of them were highly significant in both models.

Maternal education increased the probability of using harsh discipline; the greater the maternal

education, the higher the probability of using harsh discipline. Each additional year of maternal

education increased the probability of using harsh discipline by 6%, regression coefficient 0.06

(OR=1.06). Maternal age, on the other hand, decreased the risk of harsh discipline. Each

additional year of maternal age decreased the risk of harsh discipline by 7%, regression

coefficient -0.08 (OR=0.93). Maternal depression increased the risk of harsh discipline by 58%,

regression coefficient 0.52 (OR=1.58). Maternal work status was not a predictor of harsh discipline.

All family characteristics predicted harsh discipline. The number of household members increased the probability of using harsh discipline. Each additional household member increased the probability of using harsh discipline by 8%, regression coefficient 0.08 (OR=1.08). Nuclear families were 49% more likely to use harsh discipline than other family structures, regression coefficient 0.40 (OR=1.49). Household wealth increased the risk of harsh discipline; the risk of harsh discipline increased 18% for each additional standard deviation of household wealth, regression coefficient 0.16 (OR=1.18). Harsh discipline was more common among migrant families. Migrant families were 14% more likely to use this type of punishment than non-migrant families. Finally, families living in urban areas were 7% more likely to use harsh discipline than those living in rural areas, regression coefficient 0.07 (OR=1.07).

Table 5. Logistic Regression of Harsh Discipline on Intimate Partner Violence																
	Model 1				Model 2				Model 3				Model 4			
Parameter	B $_a$	SE $_b$	P $_d$	OR $_c$	B $_a$	SE $_b$	P $_d$	OR $_c$	B $_a$	SE $_b$	P $_d$	OR $_c$	B $_a$	SE $_b$	P $_d$	OR $_c$
(Intercept)	-.41	.02	***	.66	-.94	.09	***	.39	-2.07	.13	***	.13	-2.70	.15	***	.07
Intimate Partner Violence	.55	.05	***	1.73	.52	.05	***	1.68	.35	.06	***	1.42	.34	.06	***	1.41
Child Age (in Months)					.15	.04	***	1.16	.17	.04	***	1.18	.16	.04	***	1.18
Child Sex (Boys=1)					.02	.00	***	1.02	.02	.00	***	1.02	.02	.00	***	1.02
Child Health Insurance					-.17	.09	†	.84	.01	.09		1.01	.05	.10		1.05
Child Complete Vaccines					-.06	.05		.94	.00	.05		1.00	.01	.05		1.01
Maternal Education (# of Years)									.06	.00	***	1.07	.06	.00	***	1.06
Maternal Age (in Years)									-.09	.01	***	.91	-.08	.01	***	.93
Maternal Work Status (Works=1)									.01	.04		1.01	.05	.04		1.06
Maternal Depression									.49	.07	***	1.64	.52	.08	***	1.68
Number of Household Members													.08	.01	***	1.08
Type of family (Nuclear=1)													.40	.05	***	1.49
Household Wealth Index													.16	.05	**	1.18
Migration													.13	.05	**	1.14
Type of Residence (Urban=1)													.07	.02	**	1.07
Model Summary																
-2 Log likelihood	14441				14016				13171				13050			
Cox & Snell R Square	.011				.050				.122				.132			
Nagelkerke R Square	.015				.067				.164				.177			
*** p<.001, **p<.01, *p<.05, †<.10																
a Regression coefficient																
b Standard error																
c Odds ratio																
d Two-tailed test																

The model summary shows how the inclusion of the control variables in the model improves it, as shown by the increase in the R square and decline in -2 log likelihood (See Table 5).

The test for maternal education as a moderator of the relationship between harsh discipline and intimate partner violence (not shown) was negative. The interaction term was not significant. Therefore, maternal education did not moderate the relationship between harsh discipline and intimate partner violence.

4.6. Poisson Regression of Poor Child Health on Harsh Discipline and Intimate Partner Violence

In all the Poisson regression models predicting poor child health, both harsh discipline and intimate partner violence were statistically significant. Harsh discipline and intimate partner violence predicted poor child health when added together to the equation (Model 1 in Table 6) and remained as significant predictors of poor child health after controlling for child characteristics (Model 2 in Table 6), maternal characteristics (Model 3 in Table 6), and family characteristics (Model 4 in Table 6). Harsh discipline decreased in statistical significance after controlling for maternal and family factors, but it remained significant at less than the .05 level in the last model. Its regression coefficient was almost constant throughout all the models. Children from families that use harsh discipline have, on average, 7% more symptoms than those who live in families that do not use this type of discipline, regression coefficient 0.06 (OR=1.07). Intimate partner violence remained a highly significant predictor of poor child health in all the models. Its regression coefficient dropped (13%) after controlling for maternal and family factors. Children from families who reported intimate partner violence had 19% more symptoms than children from families who didn't report this type of violence (See Table 6).

The child characteristics that predicted child health were child age and child health insurance. Child age was the only child characteristic that predicted child health in all the models. Each additional month of child age decreased the number of child health symptoms by 0.2%. Table 6 only presents values with 2 decimal points. The precise regression coefficient for child age in Model 6 was -0.0020 (OR=0.998). Child health insurance showed a trend, it was only statistically significant at less than the .10 level in Model 4. Children with health insurance had 11% more symptoms than those without health insurance, regression coefficient 0.11 (OR=1.11). Child sex and child complete vaccination history were not predictors of child health on these models.

All maternal characteristics predicted child health in both models at a significance level of less than .001. Maternal education improved child health. Each additional year of maternal education decreased the number of child symptoms by 0.2%, regression coefficient -0.014 (OR=0.984). Maternal age improved child health as well. Each additional year of maternal age decreased the number of child symptoms by 0.8%, regression coefficient -0.008 (OR=0.992). Maternal employment decreased the health of children. Maternal work status increased the number of symptoms suffered by the children. Working mothers had children with an average of 9% more symptoms, regression coefficient 0.09 (OR=1.09). Finally, maternal depression decreased the health status of the children. Children with depressed mothers had children with an average of 24% more symptoms, regression coefficient 0.22 (OR=1.24), than children with nondepressed mothers.

The family characteristics that predicted child health were: number of household members and household wealth index. For each additional household member, children had on average 2% more symptoms, regression coefficient 0.02 (OR=1.02). Household wealth increased the health of children. For each additional standard deviation of the wealth index children, had

on average, 5% fewer symptoms, regression coefficient -0.05 (OR=0.95). Type of family,

migration and type of residence failed to predict the health status of children in these models.

Table 6. Poisson Regression of Poor Child Health on Harsh Discipline and Intimate Partner Violence																
	Model 1				Model 2				Model 3				Model 4			
	B a	SE b	OR c	P d	B a	SE b	OR c	P d	B a	SE b	OR c	P d	B a	SE b	OR c	P d
Intercept	0.71	0.02	2.03	***	0.71	0.06	2.03	***	0.97	0.07	2.64	***	0.85	0.09	2.33	***
Harsh Discipline	0.07	0.02	1.07	**	0.09	0.02	1.09	***	0.07	0.03	1.08	**	0.06	0.03	1.07	*
Intimate Partner Violence	0.3	0.03	1.31	***	0.27	0.03	1.32	***	0.18	0.03	1.19	***	0.17	0.03	1.19	***
Child Age (in Months)					0.00	0.00	1.00	***	0.00	0.00	1.00	**	0.00	0.00	1.00	**
Child Sex (Boys=1)					0.04	0.02	1.04		0.04	0.02	1.04		0.04	0.02	1.04	
Child Health Insurance					0.05	0.06	1.05		0.09	0.06	1.09		0.11	0.06	1.11	†
Child Complete Vaccines					-0	0.03	0.99		0.00	0.03	1.00		0.00	0.03	1.00	
Maternal Education (# of Years)									-0.02	0.00	0.98	***	-0.01	0.00	0.99	***
Maternal Age (in Years)									-0.01	0.00	0.99	***	-0.01	0.00	0.99	***
Maternal Work Status (Works=1)									0.09	0.02	1.09	***	0.09	0.02	1.09	***
Maternal Depression									0.21	0.04	1.24	***	0.22	0.04	1.24	***
Number of Household Members													0.02	0.01	1.02	***
Type of family (Nuclear=1)													-0.03	0.03	0.97	
Household Wealth Index													-0.05	-0.03	0.95	***
Migration													0.02	0.03	1.02	
Type of Residence (Urban=1)													-0.04	0.03		
Goodness of Fit	Value				Value				Value				Value			
Log Likelihood	-27423.43				-27390.73				-27255.60				-27185.30			
Akaike's Information Criterion (AIC)	54852.87				54795.45				54533.20				54402.59			
Bayesian Information Criterion (BIC)	54874.78				54846.59				54613.56				54519.48			
*** p<.001, **p<.01, *p<.05, †<.10																
a Regression coefficient																
b Standard error																
c Odds ratio																
d Two-tailed test																

The goodness of fit shows how the inclusion of the control variables improves the model,

as shown by the decline in the log likelihood (See Table 6).

4.7. Multilevel Analysis

From the fully unconditional model of poor child health in the Colombian municipalities

it was possible to estimate that the average number of children's symptoms of poor health across

municipalities was 2.32. The 95% confidence interval went from 1.08 to 4.98 symptoms. There

was variation in the number of symptoms at the municipality level that justified the multilevel analysis of the data.

4.7.1. Multilevel Poisson Regression of Poor Child Health on Community Violence

Living in a violent municipality increased the number of symptoms suffered by the children. This finding showed a trend, it was statistically significant at less than the .10 level in all the models presented in Table 7. The coefficient was similar across all models, but there was variation in significance level. The coefficient showed a trend at the .10 level when community violence was added by itself to the model (Model 1 in Table 7). It increased after adding the municipality-level unsatisfied basic needs to the model reaching the .05 level (Model 2 in Table 7) and remained after adding the child characteristics (Model 3 in Table 7). Its significance dropped again to the $p<.10$ level after adding the maternal characteristics and continued at that level in the final model when family characteristics were added (Model 4 in Table 7). Children living in more violent municipalities had, on average, 15% more symptoms than those living in less violent municipalities, regression coefficient 0.14 (OR=1.15).

Unsatisfied basic needs at the municipality level also showed a trend predicting poor child health in all the models at the .10 level. Each percentage point increase in unsatisfied basic needs increased by 0.3% the number of symptoms suffered by the children, regression coefficient 0.003 (OR=1.003).

The child factors that predicted poor child health in the model were child sex and child health insurance. Boys had 1.05 times more symptoms than girls, regression coefficient 0.05 (OR=1.05). Children with health insurance had 19% more symptoms than those without health insurance, regression coefficient 0.17 (OR=1.19). Child age and child complete vaccinations were not predictors of poor child health in these models.

The maternal characteristics that predicted poor child health were maternal age, maternal work status, and maternal depression. Each additional year of maternal age was associated with a 1% decrease in the number of symptoms suffered by the child, regression coefficient 0.01 (OR=0.99). Children of employed mothers suffered 1.07 times more symptoms than children from unemployed mothers, regression coefficient 0.07 (OR=1.07). Children from depressed mothers showed 36% more symptoms than children from nondepressed mothers, regression coefficient 0.31 (OR=1.36). Maternal education didn't predict poor child health in these models.

The only family characteristic that predicted child health on these models was type of family. Children from nuclear families had, on average, 8% fewer symptoms than children from other family structures, regression coefficient -0.08 (OR=0.92).

	Model 1				Model 2				Model 3				Model 4				Model 5			
Table 7. Multilevel Poisson Regression of Poor Child Health on Community Violence																				
FIXED EFFECTS	Coef a	SE b	OR c	Sig d	Coef a	SE b	OR c	Sig d	Coef a	SE b	OR c	Sig d	Coef a	SE b	OR c	Sig d	Coef a	SE b	OR c	Sig d
Intercept, G00	0.84	2.31	2.32	***	0.72	0.08	2.05	***	0.56	0.1	1.75	***	0.72	0.11	2.05	***	0.68	0.12	1.97	***
Community Violence, G01 e	0.13	0.07	1.14	†	0.15	0.07	1.16	*	0.14	0.07	1.15	*	0.14	0.07	1.15	†	0.14	0.07	1.15	†
Unsatisfied Basic Needs, G02 e					0.00	0.00	1.00	†	0.00	0.00	1.00	†	0.00	0.00	1.00	†	0.00	0.00	1.00	†
Child Age (in Months) f									0.00	0.00	1.00		0.00	0.00	1.00		0.00	0.00	1.00	
Child Sex (Boys=1) f									0.06	0.03	1.06	*	0.05	0.03	1.05	*	0.05	0.03	1.05	*
Child Health Insurance f									0.15	0.08	1.16	†	0.17	0.08	1.19	*	0.17	0.08	1.19	*
Child Complete Vaccines f									0.02	0.03	1.02		0.03	0.03	1.03		0.03	0.03	1.03	
Maternal Education (# of Years) f													0.00	0.01	1.00		0.00	0.00	1.00	
Maternal Age (in Years) f													-0.01	0.00	0.99	***	-0.01	0.00	0.99	**
Maternal Work Status (Works=1) f													0.07	0.03	1.07	**	0.07	0.03	1.07	*
Maternal Depression f													0.32	0.05	1.38	***	0.31	0.05	1.36	***
Number of Household Members f																	0.00	-0.01	1.00	
Type of family (Nuclear=1) f																	-0.08	0.04	0.92	*
Household Wealth Index f																	-0.02	0.02	0.98	
Migration f																	0.00	0.03	1.00	
Type of Residence (Urban=1) f																	0.00	0.04	1.00	
RANDOM EFFECTS	SD	Variance	Sig		SD	Variance	Sig		SD	Variance	Sig		SD	Variance	Sig		SD	Variance	Sig	
Intercept, U0	0.39	0.15	***		0.38	0.14	***		0.37	0.14	***		0.37	0.14	***		0.37	0.14	***	
RELIABILITY																				
Intercept, B0	89%				89%				88%				88%				88%			
All the models correspond to population models with robust standard errors																				
*** p<.001, **p<.01, *p<.05, †<.10																				
a Regression coefficient				e Variable at level 2 grand mean centered															
b Standard error				f Variable at level 1, grand mean centered, fixed variance															
c Odds ratio																				
d Two-tailed test																				

The reliability of all models presented in Table 7 was very high. It ranged from 88% to 89%.

4.7.2. Multilevel Logistic Regression of Harsh Discipline on Community Violence

Living in a violent municipality increased the probability of using harsh disciplinary practices. This finding was statistically significant at less than the .001 level in all the models presented in Table 8. The coefficient increased by 18% after adding all the variables. Families living in more violent municipalities had, on average, a 69% greater likelihood of using harsh discipline than those living in less violent municipalities, regression coefficient 0.53 (OR=1.69).

Unsatisfied basic needs at the municipality level also predicted harsh disciplinary practices in all the models, but its significance level dropped from less than .01 to less than .10

after adding family characteristics. Each percentage point increase in unsatisfied basic needs increased by 0.4% the probability of using harsh disciplinary practices, regression coefficient 0.004 (OR=1.004).

The child factors that predicted poor child health in the model were child age and child sex. Older children were more likely to live in a family that used harsh disciplinary practices than younger ones, each additional month of child age increased the risk of harsh discipline in 2%, regression coefficient 0.02 (OR=1.02). Boys were 18% more likely to live in families using harsh discipline than girls, regression coefficient 0.17 (OR=1.18). Child health insurance and child vaccination history were not predictors of harsh discipline.

The maternal characteristics that predicted harsh discipline were maternal education, maternal age, and maternal depression. Each additional year of maternal education decreased the probability of harsh discipline by 7%, regression coefficient -0.08 (OR=0.93). Each additional year of maternal age increased the probability of using harsh discipline by 6%, regression coefficient 0.06 (OR=1.06). Depressed mothers were almost two times more likely to live in households using harsh discipline than non-depressed mothers, regression coefficient 0.68 (OR=1.98).

All family characteristics included in the model predicted harsh discipline. Each additional household member increased the probability of using harsh discipline by 8%, regression coefficient 0.07 (OR=1.08). Nuclear families were 47% more likely to use harsh discipline practices than non-nuclear families, regression coefficient 0.38 (OR=1.47). Each standard deviation on the household wealth index decreased the probability of using harsh discipline by 7%, regression coefficient -0.07 (OR=0.93). Migrant families were 2% more likely to use harsh discipline than nonmigrants, regression coefficient 0.02 (OR=1.02). Finally, families

living in urban areas were 11% less likely to use harsh discipline than those living in rural areas, regression coefficient -0.11(OR=0.89).

Table 8. Multilevel Logistic Regression of Harsh Discipline on Community Violence																			
	Model 1				Model 2				Model 3				Model 4				Model 5			
FIXED EFFECTS	Coef a	SE b	OR c	Sig d	Coef a	SE b	OR c	Sig d	Coef a	SE b	OR c	Sig d	Coef a	SE b	OR c	Sig d	Coef a	SE b	OR c	Sig d
Intercept, G00	-0.23	0.04	0.79	***	-0.23	0.04	0.79	***	-0.24	0.05	0.79	***	-0.30	0.05	0.74	***	-0.31	0.05	0.73	***
Community Violence, G01 e	0.41	0.10	1.51	***	0.45	0.10	1.57	***	0.477	0.10	1.61	***	0.51	0.11	1.67	***	0.53	0.11	1.69	***
Unsatisfied Basic Needs, G02 e					0.01	0.00	1.01	**	0.01	0.00	1.01	**	0.01	0.00	1.01	**	0.00	0.00	1.00	†
Child Age (in Months) f									0.03	0.00	1.03	***	0.02	0.00	1.02	***	0.02	0.00	1.02	***
Child Sex (Boys=1) f									0.157	0.04	1.17	***	0.17	0.04	1.18	***	0.17	0.04	1.18	***
Child Health Insurance f									-0.15	0.09	0.86		-0.06	0.10	0.94		-0.05	0.10	0.96	
Child Complete Vaccines f									-0.09	0.05	0.91	†	-0.04	0.05	0.96		-0.03	0.05	0.97	
Maternal Education (# of Years) f													-0.09	0.01	0.92	***	-0.08	0.01	0.93	***
Maternal Age (in Years) f													0.07	0.00	1.07	***	0.06	0.00	1.06	***
Maternal Work Status (Works=1)													0.02	0.04	1.02		0.06	0.05	1.06	
Maternal Depression f													0.66	0.07	1.94	***	0.68	0.07	1.98	***
Number of Household Members f																	0.07	0.01	1.08	***
Type of family (Nuclear=1) f																	0.38	0.05	1.47	*
Household Wealth Index f																	-0.07	0.03	0.93	**
Migration f																	0.02	0.05	1.02	**
Type of Residence (Urban=1) f																	-0.11	0.06	0.89	†
RANDOM EFFECTS	SD	Variance	Sig		SD	Variance	Sig		SD	Variance	Sig		SD	Variance	Sig		SD	Variance	Sig	
Intercept, U0	0.54	0.30	***		0.53	0.28	***		0.562	0.32	***		0.61	0.37	***		0.62	0.38	***	
RELIABILITY																				
Intercept, B0	65%				64%				65%				67%				67%			
All the models correspond to population models with robust standard errors																				
*** p<.001, **p<.01, *p<.05, †<.10																				
a Regression coefficient				e Variable at level 2 grand mean centered															
b Standard error				f Variable at level 1, grand mean centered, fixed variance															
c Odds ratio																				
d Two-tailed test																				

The reliability of all models presented in Table 8 ranged from 64% to 67%.

4.7.3. Multilevel Logistic Regression of Intimate Partner Violence on Community Violence

Community violence failed to predict intimate partner violence. None of the effects of community violence on intimate partner violence, presented in Table 9, was statistically significant. The same was true for unsatisfied basic needs at the municipality level. Unsatisfied basic need did not predict intimate partner violence.

The child factors that predicted poor child health in the model were child age and child sex. Older children were more likely to live in families exposed to intimate partner violence than younger ones; each additional month of child age increased the risk of intimate partner violence

by 1%, regression coefficient 0.01 (OR=1.01). Boys were 17% more likely to live in families reporting intimate partner violence than girls, regression coefficient 0.16 (OR=1.17). Child health insurance and child complete vaccinations were not predictors of intimate partner violence.

All the maternal characteristics included in the model predicted intimate partner violence. Each additional year of maternal education decreased the probability of intimate partner violence by 6%, regression coefficient -0.06 (OR=0.94). Each additional year of maternal age decreased the probability of intimate partner violence by 3%, regression coefficient -0.03 (OR=0.97). Working mothers were 33% more likely to suffer intimate partner violence than nonworking mothers, regression coefficient 0.29 (OR=1.33). Depressed mothers were 15 times more likely to suffer intimate partner violence than non-depressed mothers, regression coefficient 2.71 (OR=15.04).

The family characteristics that predicted intimate partner violence were migration and type of residency. Migrant families were 23% more likely to experience intimate partner violence than nonmigrant families, regression coefficient 0.21 (OR=1.23). Families living in urban areas were 17% more likely to experience intimate partner violence than those living in rural areas, regression coefficient -0.11(OR=1.19).

FIXED EFFECTS	Model 1 Coef [a]	SE [b]	OR [c]	Sig [d]	Model 2 Coef [a]	SE [b]	OR [c]	Sig [d]	Model 3 Coef [a]	SE [b]	OR [c]	Sig [d]	Model 4 Coef [a]	SE [b]	OR [c]	Sig [d]	Model 5 Coef [a]	SE [b]	OR [c]	Sig [d]
Intercept, G00	-1.49	0.04	0.22	***	-1.49	0.04	0.22	***	-1.50	0.04	0.22	***	-1.70	0.04	0.18	***	-1.71	0.05	0.18	***
Community Violence, G01 [e]	-0.06	0.08	0.94		0.00	0.00	1.00		-0.04	0.08	0.96		0.00	0.00	1.00		-0.15	0.09	0.86	
Unsatisfied Basic Needs, G02 [e]					-0.05	0.08	0.95		0.00	0.00	1.00		-0.14	0.09	0.87		0.00	0.00	1.00	
Child Age (in Months) f									0.01	0.00	1.01	***	0.01	0.00	1.01	**	0.01	0.00	1.01	**
Child Sex (Boys=1) f									0.12	0.05	1.13	*	0.093	0.06	1.10	†	0.16	0.08	1.17	†
Child Health Insurance f									-0.10	0.11	0.90		0.128	0.13	1.14		0.11	0.13	1.12	
Child Complete Vaccines f									-0.11	0.06	0.90	†	-0.05	0.07	0.96		-0.01	0.08	0.99	
Maternal Education (# of Years) f													-0.06	0.01	0.95	***	-0.06	0.01	0.94	***
Maternal Age (in Years) f													-0.03	0.00	0.97	***	-0.03	0.00	0.97	***
Maternal Work Status (Works=1) f													0.279	0.06	1.32	***	0.29	0.06	1.33	***
Maternal Depression f													2.56	0.07	12.94	***	2.71	0.09	15.04	***
Number of Household Members f																	0.00	0.01	1.00	
Type of family (Nuclear=1) f																	0.09	0.08	1.09	
Household Wealth Index f																	-0.04	0.04	0.96	
Migration f																	0.21	0.11	1.23	*
Type of Residence (Urban=1) f																	0.17	0.09	1.19	*
RANDOM EFFECTS	SD	Variance	Sig		SD	Variance	Sig		SD	Variance	Sig		SD	Variance	Sig		SD	Variance	Sig	
Intercept, U0	0.31	0.09			0.30	0.09			0.30	0.09			0.31	0.10	***		0.30	0.81	***	
RELIABILITY																				
Intercept, B0	32%				32%				31%				29%				27%			

Table 9. Multilevel Logistic Regression of Intimate Partner Violence on Community Violence

All the models correspond to population models with robust standard errors

    *** p<.001, **p<.01, *p<.05, †<.10

a Regression coefficient   e Variable at level 2 grand mean centered

b Standard error   f Variable at level 1, grand mean centered, fixed variance

c Odds ratio

d Two-tailed test

The reliability of all models presented in Table 9 was low. It ranged from 27% to 32%.

4.7.4. Multilevel Modeling of Poor Child Health on Harsh Discipline and Intimate Partner Violence

The within-municipalities model presented in Table 10 shows how harsh discipline and intimate partner violence predicted poor child health controlling for child characteristics, maternal characteristics, and family characteristics within Colombian municipalities.

Harsh Discipline failed to predict poor child health. Its association with poor child health was not significant in any model. The random effects section in Table 10 shows that the adjusted variance of the relationship between harsh discipline and poor child health was highly significant, leaving room for community factors to explain it.

To the contrary, intimate partner violence predicted child health in all the models at least at the 0.01 level. Children from families that experienced intimate partner violence had on average 18% more symptoms than those living in families without intimate partner violence, regression coefficient 0.17 (OR=1.18). The random effects section in Table 10 shows a highly significant adjusted variance of the relationship between intimate partner violence and poor child health, leaving room for community factors to explain it.

The child factors that predicted poor child health in the model were child sex and child health insurance. Boys presented 6% more symptoms than girls, regression coefficient 0.06 (OR=1.06). Children with health insurance had 19% more symptoms than those without health insurance, regression coefficient 0.17 (OR=1.19). Child age and child complete vaccinations were not predictors of poor child health in these models.

The maternal characteristics that predicted poor child health were: maternal age, maternal work status, and maternal depression. Maternal education did not predict poor child health in these models. Each additional year of maternal age decreased the number of symptoms suffered

by the child by 1%, regression coefficient 0.01 (OR=0.99). Children from working mothers suffered 6% more symptoms than children from unemployed mothers, regression coefficient 0.06 (OR=1.06). Children from depressed mothers presented 28% more symptoms than children from non-depressed mothers, regression coefficient 0.25 (OR=1.28).

The family characteristics that predicted child health on these models were: type of family and number of household members. Children from nuclear families had on average 8% fewer symptoms than children from other family structures, regression coefficient -0.08 (OR=0.92). Each additional household member increased the number of symptoms suffered by the children in 1%, regression coefficient 0.01 (OR=1.01).

Table 10. Multilevel Poisson Regression of Poor Child Health on Harsh Discipline and Intimate Partner Violence															
	Model 1				Model 2				Model 3				Model 4			
FIXED EFFECTS	Coef a	SE b	OR c	Sig d	Coef a	SE b	OR c	Sig d	Coef a	SE b	OR c	Sig d	Coef a	SE b	OR c	Sig d
Intercept, G00	0.84	0.03	2.31	***	0.83	0.03	2.30	***	0.83	0.03	2.29	***	0.83	0.03	2.29	***
Harsh Discipline e	-0.07	0.05	0.93		-0.06	0.05	0.94		-0.06	0.05	0.94		-0.06	0.05	0.94	
Intimate Partner Violence e	0.27	0.04	1.32	***	0.27	0.04	1.31	***	0.17	0.05	1.18	**	0.17	0.05	1.18	**
Child Age (in Months) f					0.00	0.00	1.00		0.00	0.00	1.00		0.00	0.00	1.00	
Child Sex (Boys=1) f					0.06	0.03	1.06	*	0.06	0.02	1.06	**	0.06	0.03	1.06	*
Child Health Insurance f					0.15	0.07	1.16	*	0.17	0.07	1.18	*	0.17	0.07	1.19	*
Child Complete Vaccines f					0.02	0.03	1.02		0.03	0.03	1.03		0.03	0.03	1.03	
Maternal Education (# of Years) f									0.00	0.01	1.00		0.00	0.01	1.00	
Maternal Age (in Years) f									-0.01	0.00	0.99	**	-0.01	0.00	0.99	**
Maternal Work Status (Works=1) f									0.07	0.03	1.07	**	0.06	0.03	1.06	*
Maternal Depression f									0.25	0.04	1.28	***	0.25	0.04	1.28	***
Number of Household Members f													0.01	0.01	1.01	†
Type of family (Nuclear=1) f													-0.08	0.04	0.92	*
Household Wealth Index f													-0.02	0.02	0.98	
Migration f													-0.02	0.03	0.98	
Type of Residence (Urban=1) f													-0.01	0.04	0.99	
RANDOM EFFECTS																
	SD	Variance		Sig	SD	Variance		Sig	SD	Variance		Sig	SD	Variance		Sig
INTRCPT1, U0	0.38	0.14		***	0.378	0.14		***	0.376	0.14		***	0.38	0.14		***
Harsh Discipline slope, U1	0.49	0.24		***	0.49	0.24		***	0.508	0.26		***	0.51	0.26		***
Intimate Partner Violence slope, U2	0.45	0.202		***	0.451	0.20		***	0.447	0.20		***	0.44	0.19		***
RELIABILITY																
Intercept, B0	89%				89%				89%				89%			
Severe Physical Punishment, B1	75%				75%				76%				76%			
Intimate Partner Violence, B2	66%				66%				65%				65%			
All the models correspond to population models with robust standard errors																
*** p<.001, **p<.01, *p<.05, †<.10																
a Regression coefficient	e Variable at level 1, group mean centered, free variance															
b Standard error	f Variable at level 1, grand mean centered, fixed variance															
c Odds ratio																
d Two-tailed test																

The models had good reliabilities; intercept 89%, harsh discipline 76%, and intimate partner violence 65%.

4.7.5. Multilevel Modeling of Poor Child Health on Harsh Discipline, Intimate Partner Violence and Community Violence

The between-municipalities model presented in Table 11 shows how harsh discipline and intimate partner violence predicted poor child health considering community violence and

unsatisfied basic needs at the municipality level, and controlling for child characteristics, maternal characteristics, and family characteristics.

Community violence predicted poor child health. Children living in violent communities had 16% more symptoms than those living in nonviolent communities, regression coefficient 0.15 (OR=1.16).

Harsh discipline failed to predict poor child health. Community violence failed to modify the relationship between harsh discipline and poor child health. Municipality unsatisfied basic needs did not modify this relationship either. The adjusted variance of the relationship between harsh discipline and poor child health remained highly significant despite the inclusion of community violence and municipality unsatisfied basic needs.

Intimate partner violence predicted child health. Children from families that experienced intimate partner violence had on average 18% more symptoms than those living in families without intimate partner violence, regression coefficient 0.17 (OR=1.18). Community violence failed to modify the relationship between intimate partner violence and poor child health. In contrast, unsatisfied basic needs at the community level increased the effect of intimate partner violence on poor child health. Each additional percentile point of unsatisfied basic needs increased the effect of intimate partner violence on poor child health by 0.4%. The adjusted variance of the relationship between intimate partner violence and poor child health remained constant and highly significant.

All other variables in the model had the same regression coefficients as Model 4 in Table 10.

The reliabilities of the model were good; intercept 89%, harsh discipline 77%, and intimate partner violence 65%.

Table 11. Multilevel Poisson Regression of Poor Child Health on Harsh Discipline and Intimate Partner Violence Considering the Effects of Community Violence

FIXED EFFECTS	Coef [a]	SE [b]	OR [c]	Sig [d]
Intercept, G00	0.83	0.03	2.29	***
Community Violence, G01 [g]	0.15	0.07	1.16	*
Unsatisfied Basic Needs, G02 [g]	0.00	0.00	1.00	†
Harsh Discipline [e]	-0.08	0.05	0.92	
Community Violence, G01 [h]	0.12	0.10	1.13	
Unsatisfied Basic Needs, G02 [h]	0.00	0.00	1.00	
Intimate Partner Violence [e]	0.17	0.05	1.18	**
Community Violence, G01 [h]	-0.09	0.10	0.92	
Unsatisfied Basic Needs, G02 [h]	0.00	0.00	1.00	†
Child Age (in Months) [f]	0.00	0.00	1.00	
Child Sex (Boys=1) [f]	0.06	0.03	1.06	*
Child Health Insurance [f]	0.17	0.07	1.19	*
Child Complete Vaccines [f]	0.03	0.03	1.03	
Maternal Education (# of Years) [f]	0.00	0.01	1.00	
Maternal Age (in Years) [f]	-0.01	0.00	0.99	**
Maternal Work Status (Works=1) [f]	0.06	0.03	1.06	*
Maternal Depression [f]	0.25	0.04	1.28	***
Number of Household Members [f]	0.01	0.01	1.01	†
Type of family (Nuclear=1) [f]	-0.08	0.04	0.92	*
Household Wealth Index [f]	-0.02	0.02	0.98	
Migration [f]	-0.03	0.03	0.97	
Type of Residence (Urban=1) [f]	0.00	0.04	1.00	
RANDOM EFFECTS				
	SD	Variance		Sig
INTRCPT1, U0	0.362	0.13		***
Harsh Discipline slope, U1	0.517	0.27		***
Intimate Partner Violence slope, U2	0.448	0.20		***
Reliability				
Intercept, B0	89%			
Severe Physical Punishment, B1	77%			
Intimate Partner Violence, B2	65%			

All the models correspond to population models with robust standard errors

*** $p<0.001$, **$p<0.01$, *$p<0.05$, †<0.1

[a] Regression coefficient

[b] Standard error

[c] Odds ratio

[d] Two-tailed test

[e] Variable at level 1, group mean centered, free variance

[f] Variable at level 1, grand mean centered, fixed variance

[g] Variable at level 2, grand mean centered, modeling the intercept

[h] Variable at level 2, grand mean centered, modeling the slope

Chapter 5: Discussion

5.1. The Hypotheses Considering the Results

This research is the first to examine the effects of violence on the physical

health status of children in Colombia. It studied 10,681 children living in 230

municipalities. A summary of the eight hypotheses and major results is presented in

Table 12.

Table 12. Hypotheses and Corresponding Results	
Hypotheses	Results
Hypothesis 1:	Partially supported for the family level analyses
Young children whose parents did not use harsh physical discipline practices during the previous year, are expected to be in better health than those whose parents used such practices during the same period.	
Hypothesis 2:	Supported
Young children of households where intimate partner violence was absent during the previous year, are expected to be in better health than those of households where intimate partner violence was present during the same period.	
Hypothesis 3:	Supported
Young children of households where intimate partner violence was absent during the previous year, are expected to have experienced less parental harsh discipline than those of households where intimate partner violence was present during the same period.	
Hypothesis 4:	Supported
Young children of households located in less violent geographical areas are expected to be in better health than those of households located in more violent areas.	
Hypothesis 5:	Supported
Children from households located in more violent geographical areas are more likely to experience harsh discipline than those located in less violent areas.	
Hypothesis 6:	Not Supported
Children from households located in more violent geographical areas are more likely to witness intimate partner violence than those in less violent areas.	
Hypothesis 7:	Not Supported
The effects of intimate partner violence and harsh discipline practices on child health are greater for children from households located in more violent geographical areas than for those located in less violent areas.	
Hypothesis 8:	Not Supported
Maternal education moderates the relationship between violence and children physical health. Educated mothers mitigate the effects of community violence, intimate partner violence, and drastic discipline practices on child health.	

Hypothesis 1: Young children whose parents did not use harsh physical discipline

practices during the previous year, are expected to be in better health than those

whose parents used such practices during the same period.
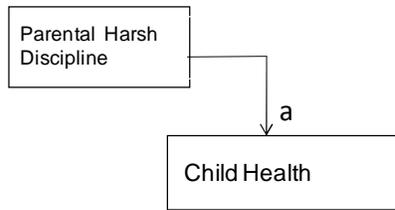
This study provides mixed evidence on the association between harsh discipline and poor child health. While all generalized linear Poisson regression models predicting poor child health as a result of severe physical punishing practices showed a statistically significant decrease in child health when harsh discipline was present, the association was not significant in multilevel models. When community violence and unsatisfied basic needs at the municipality level were introduced in the multilevel analysis, harsh discipline failed to predict poor child physical health. Evidence is not conclusive to support or reject the hypothesis that children who are subject to harsh physical discipline practices during the previous year are more likely to exhibit poor physical health.

Consistent with ecological theory and earlier research (Pinzon-Rondon & Ramirez-Herrera, 2006), these seemingly contradictory findings may be explained by strong cultural variations in parental discipline practices across regions of Colombia. A previous study found that parents in the Pacific region of the country are more likely to use harsh discipline practices than those in the Atlantic region (Pinzon-Rondon & Ramirez-Herrera, 2006), and parents in the southern areas of the Pacific region are more likely to discipline children with objects than parents in the northern ones (Pinzon-Rondon & Ramirez-Herrera, 2006). It is thus conceivable that harsh discipline practices may be associated with poor child health in some regions of Colombia and not in others, depending on cultural variations on punishing practices

across regions. Supporting this explanation is the highly significant variance of the slope of harsh discipline on poor child health, presented in the random effects section of Table 11. The analysis of the effect of community violence on harsh discipline (Table 8) shows that there is a strong association between community violence and disciplinary practices. Controlling for community violence removes some of the variability and, therefore, the association between discipline and health. This suggests that more research needs to examine unexplored municipal characteristics affecting disciplinary practices, and, consequently, child health. Currently available data does not provide sufficiently disaggregated information to differentiate more nuanced variations among harsh disciplinary practices in different regions of Colombia. To the author's knowledge this information is nonexistent for most regions of the country. Further research examining community differences in disciplinary practices is necessary to validate or reject Hypothesis 1.

Hypothesis 2: *Young children of households where intimate partner violence was absent during the previous year, are expected to be in better health than those of households where intimate partner violence was present during the same period.*
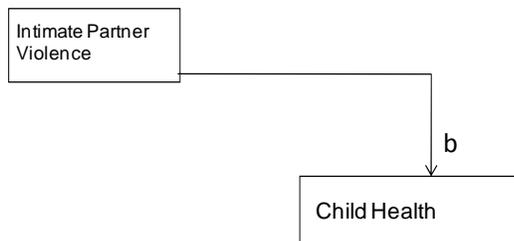
The results strongly support Hypothesis 2. Even if children are not abused directly, children's health is affected by an environment of violence at home. Consistent with family stress theory, intimate partner violence significantly predicted child health in

all models. A significant increase in poor child health symptoms was found in families experiencing intimate partner violence. A strong association was found in all generalized linear Poisson regression models, net of child, maternal and family controls.

This strong statistical association remained in multilevel models. When community violence and unsatisfied basic needs at the municipality level were introduced in the multilevel analysis, intimate partner violence remained a strong predictor of poor child health. Children from families experiencing intimate partner violence were found in the final model to have on average 18% more symptoms than those from families where intimate partner violence was absent.

This finding is also consistent with earlier research with small samples showing that child exposure to intimate partner violence is associated with physical and psychological disease (Onyskiw, 2003; Shannon, 2009). To the author's knowledge, this is the first study to find a strongly significant association between intimate partner violence and poor child physical health in Colombia.

Hypothesis 3: *Young children of households where intimate partner violence was absent during the previous year, are expected to have experienced less parental harsh discipline than those of households where intimate partner violence was present during the same period.*

```
┌──────────────────┐
│ Intimate Partner │
│ Violence         │
└──────────────────┘
          │
          ▼  C
   ┌──────────────────┐
   │ Parental Harsh   │
   │ Discipline       │
   └──────────────────┘
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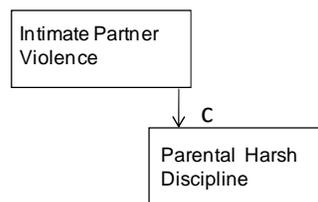
The results also support Hypothesis 3. Consistent with family stress theory and earlier research (Barnett et al., 2005; Radford & Hester, 2006), the logistic regression models predicting harsh discipline from intimate partner violence showed a statistically significant relationship, net of child, maternal and family controls. Families experiencing intimate partner violence were 40% more likely to use harsh discipline practices. Intimate partner violence produces stress in families. This stress predisposes parents to use harsh disciplinary practices to correct their children.

The co-occurrence of different types of domestic violence in the same family has been widely documented. Intimate partner violence and child abuse are often found together. Abusive husbands often abuse their children as well (Zinc, et al, 2003). Additionally, parenting children in a violent environment is not an easy task, even for the nonviolent parent (Zinc, et al 2003). Distressed mothers are more likely than their non-abused peers to physically abuse their children and sometimes they are unable to respond to their children's needs (Feerick & Silverman, 2006; Radford & Hester, 2006). It is very difficult for abused women to discipline their children. Around half of mothers affected by domestic violence acknowledge parenting problems such as poor communication, harsh discipline, and child rejection (McCue, 2008; Radford & Hester, 2006).

Hypothesis 4: Young children of households located in less violent geographical areas are expected to be in better health than those of households located in more violent areas.

Level 2:
Community

Community Violence

Level 1: Family and
Child

d
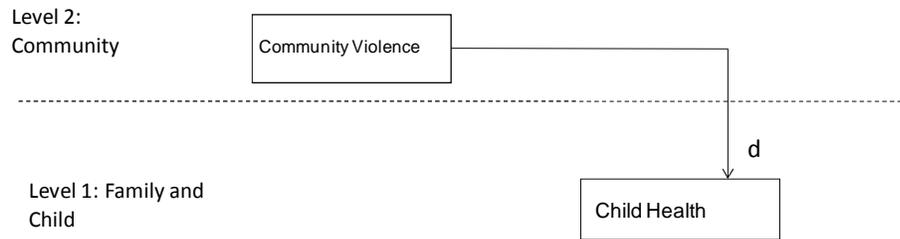
Child Health

The results support Hypothesis 4. Consistent with ecological theory,

community violence was associated with poor child health, controlling for child,

maternal and family characteristics. This finding was present in all multilevel

regression models. Children from households located in violent communities had

16% more symptoms than those located in nonviolent communities. This association

remained after including harsh discipline and intimate partner violence in the model

(Table 10).

This finding is consistent with earlier research showing an association

between community violence and child injuries (Haynes et al., 2003; Reading et al.,

1999).

The violence experienced in some Colombian communities has generated a

series of negative outcomes in these places (Agrast, et al.; "Colombia," 2007; Posada

& Wainrvb, 2008; US Department of State, 2007). Some of these outcomes such as

lack of social capital, high levels of stress, and limited infrastructure, could be

responsible for the poorer health experienced by Colombian children living in violent

communities as compared with those living in more peaceful places. Violence limits

the number of social networks available to people and increases feelings of distrust

and insecurity; this absence of social capital has been associated with poor health

outcomes (Berkman & Kawachi, 2000). Community violence stresses children.

Stressed children have higher levels of corticosteroids (Leonard, 2000; Nance,

Rayson & Carr, 1987; Raison & Miller, 2001), which has been associated with poor child health (Shirtcliff et al., 2009). Finally, violence in Colombia has destroyed physical infrastructure and limited the availability of health professionals in many areas of the country ("Colombia," 2007; Posada & Wainrvb, 2008; US Department of State, 2007), which can explain negative health outcomes in these areas.

Hypothesis 5: Children from households located in more violent geographic areas are more likely to experience harsh discipline than those located in less violent areas.

Level 2:
Community   Community Violence

- -

                                              e   Parental Harsh
Level 1: Family and   Discipline
Child
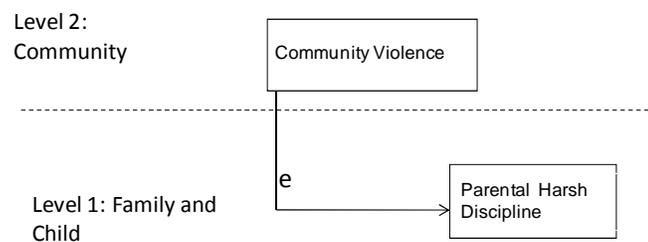
   The results support Hypothesis 5. Consistent with ecological theory, community violence was associated with harsh discipline, controlling for child, maternal and family characteristics. This finding was present in all multilevel regression models. Families living in more violent municipalities had, on average, a 69% higher likelihood of using harsh discipline than those living in less violent municipalities.

   This finding is consistent with earlier research showing an association between community violence and aggressive parenting practices (Mrug & Windle, 2009).

Community violence acts as an environmental stressor to parents. According to ecological theory this deprived environment affects people. Living in an unsafe community generates feelings of insecurity. Parents fear not only for their own safety but particularly for their children safety (Berkman & Kawachi, 2000). Fear predisposes parents to employ harsh disciplinary practices to ensure their children's safety. Many authors have found that stressed parents have difficulties parenting their children (Feerick & Silverman, 2006; Radford & Hester, 2006).

Hypothesis 6: Children from households located in more violent geographical areas are more likely to witness intimate partner violence than those in less violent areas.

Level 2: Community | Community Violence

f

Level 1: Family and Child | Intimate Partner Violence
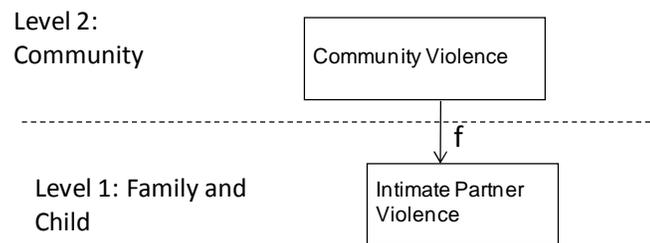
The results do not support Hypothesis 6. Community violence was not associated with intimate partner violence.

While this finding is inconsistent with earlier research showing an association between community violence and intimate partner violence (Raghavan et al., 2002), it is important to consider that the earlier research used a small sample (50 women) from a very different culture (six US cities). Another important consideration is the low reliability of the model in the present study (27%). It is possible that municipality factors not considered in this analysis, such as cultural differences among the regions,

might be responsible for the lack of association. It is also possible that intimate

partner violence is substantially distinct from community violence.

Intimate partner violence and community violence could be the result of very

different causal pathways in Colombia. On one hand, intimate partner violence could

be the consequence of cultural beliefs about gender roles in society (Carreno

Samaniego, 2008). In Colombia, machismo prevails, particularly in low

socioeconomic segments of the country. Traditions such as a man's possession of his

spouse and a woman's marital obligations, while having decreased over time, are still

widely accepted (Abranzon, 2004; Betancourt, 2004). On the other hand, community

violence is probably the result of socio-political problems fueled by the traffic of

narcotics present in the country ("Colombia," 2007; Posada & Wainrvb, 2008; US

Department of State, 2007). These very different causal pathways could explain the

lack of association between these two types of violence.

Hypothesis 7: The effects of intimate partner violence and harsh discipline practices

on child health are greater for children from households located in more violent

geographic areas than for those located in less violent areas.
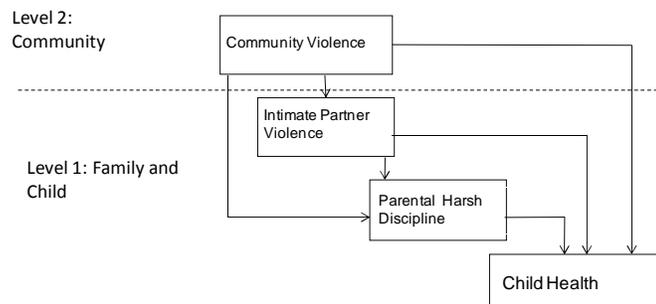
Interestingly, Hypothesis 7 was not supported. The results do not support the theory arguing that the health effect of witnessing intimate partner violence and experiencing harsh discipline will be stronger in more violent geographic areas.

The association between intimate partner violence and poor child health was found to be independent of community violence; the later did not modify the relationship between the former.

The presence of community violence is not a buffer to the relationship of other types of violence and child health. The addition of this factor to the equations did not modify the results. This could be explained by, 1) the size of communities considered in this study. Colombian municipalities could be very big and diverse. Some municipalities include both peaceful and very violent areas ("Colombia", 2007), and 2) the effects of intimate partner violence and harsh discipline on child health are independent of community violence. Community violence does not moderate this relationship.

Additionally, harsh discipline failed to predict poor child health when community violence and unsatisfied basic needs at the municipality level were included in the equation. This could be explained by cultural differences regarding child rearing practices throughout Colombia. Probably in the places where the use of physical punishment is widely accepted, this practice is not as stressing to children and therefore is less likely to predispose to health problems (Pinzon-Rondon & Ramirez 2006).

Hypothesis 8: Maternal education moderates the relationship between violence and

children's physical health. Educated mothers mitigate the effects of community

violence, intimate partner violence, and drastic discipline practices on child health.
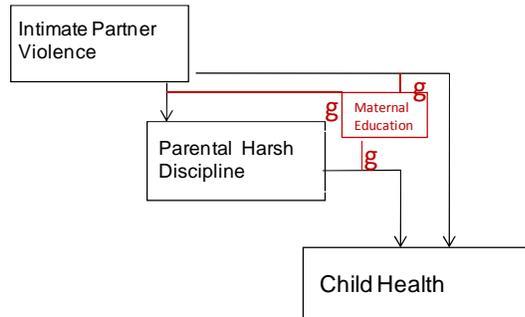
Consistent with family stress theory, maternal education was a resource for

the family and improved child health. Greater maternal education was statistically

significantly associated with better child health in all generalized linear Poisson

regression models; each additional year of maternal education increased symptoms of

poor child health by 1.5%. However, results are not conclusive, as statistical

significance disappears in the multilevel analysis. This may be explained by

previously documented strong cultural variations in parenting practices across regions

of Colombia (Pinzon-Rondon & Ramirez-Herrera, 2006).

Additionally, maternal education did not moderate any of the relationships

under consideration: between poor child health and harsh discipline practices;

between poor child health and intimate partner violence, and between parental

discipline practices and intimate partner violence. Thus, the results did not support

Hypothesis 8.

5.2. Poverty

Two measures of poverty (socioeconomic status) were considered in this study: 'unattended basic needs', which reflect poverty at the municipality level, and the household wealth index, which measures poverty at the household level.

'Unattended basic needs' was found to be a significant predictor of poor child health. This finding is consistent with ecological theory arguing that the health status of children is affected not only by the children's characteristics but also by the characteristics of the environment. The finding is consistent with previous research linking socioeconomically deprived neighborhoods with the incidence of infectious diseases ("Monitoring the Situation of Children and Women," 2009; World Health Organization, 2009).

Additionally, unattended basic needs at the community level increased the effect of intimate partner violence on poor child health by 0.4%. This finding is consistent with ecological theory. Children living in municipalities with higher levels of unattended basic needs are more likely to be in poor health when exposed to intimate partner violence.

Interestingly, while the household wealth index was a strong predictor of poor child health in all generalized linear Poisson regression models, it was not a significant predictor of poor child health in the multilevel analysis. These findings suggest that poverty at the community level may affect the health status of young children more than poverty at the household level.

5.3. Other control variables

Health insurance coverage presented an unexpected statistically significant association with child health. Children with health insurance had more symptoms of poor health than those with no insurance. This could be due to the Colombian policy of universal health coverage (Ministerio de la Proteccion Social, 2006). Sick children are expected to be more likely to obtain a health insurance card, since they need one to receive healthcare services. Similarly, mothers of healthy children may be less likely to report insurance coverage, because in the absence of necessity they are less likely to do the extensive paperwork needed to obtain an insurance card.

Child age and sex had a statistically significant association with child health in some models. These associations were as expected. Boys had poorer health than girls (United Nations, 1998) and older children were healthier than younger ones (Behrman RE, 2000). Consistent with previous research, children of older mothers were also healthier than those of younger mothers (Canning et al., 2010; Pittard et al., 2008).

This study supports the argument that maternal employment during the first years of the child's life has detrimental effects on the child's health (Baydar & Brooks-Gunn, 1991; Berger et al., 2005). Maternal employment was associated with poor health outcomes in all the models. It may also be that other factors explain both maternal employment and poor child health, such as low socioeconomic status.

The study found that depressed mothers had sicker children than non-depressed mothers. Two different reasons may explain this. First, depressed mothers could report more symptoms as a result of their pessimistic emotional state (Waters et al., 2000). Second, depressed mothers could actually have sicker children. They could

become depressed due to their children's illness or their disturbed mood and consequent failure to adequately care for them could negatively influence the health status of their children (Downey & Coyne, 1990).

Consistent with the literature, children from intact nuclear families had better health in the multilevel models than those from other family structures (Dawson, 1991). Children living in intact nuclear families are more likely to count with the support of father and mother, and are less likely to have suffered the effects of a stressful marital dissolution (Dawson, 1991).

This study provides additional evidence on the negative effects that large family units have on child health, which is consistent with the extant literature (Office of the Deputy Prime Minister, 2004). Children living in extended families have to share the limited resources with a larger number of people. This decreases the resources available to them and increases the probability of bad outcomes (Office of the Deputy Prime Minister, 2004). Additionally, they are more likely to be exposed to infectious diseases (Office of the Deputy Prime Minister, 2004).

5.4. Biological plausibility

Previous research on the response by the body to traumatic experiences helps to explain the results of the present investigation. Traumatic insults can lead to biological changes that affect the immunological system and predispose to infectious diseases.

Exposure to stressors, such as harsh discipline, intimate partner violence, and community violence, during early life produces anxiety in the child. It has the

potential to exacerbate preexisting biological vulnerabilities (Lewis, 1992) and to generate new ones (Teicher, 2000). The pituitary-adrenal-axis is stimulated when the child is anxious. The exposure to stressors triggers the release of corticotrophin releasing factor (CRF) from nerve cells in the hypothalamus into the blood stream, the CRF stimulates the production of adrenocorticotrophic hormone (ACTH) by the anterior pituitary, and ACTH activates the release of cortisol by the adrenal glands. These stress hormones cause biochemical and anatomic changes to the body. First, they change the shape of the largest neurons in the hippocampus, killing some of them (Teicher et al., 2006); second, they stop the production of new neurons (Teicher et al., 2006); third, they exacerbate the electrical activity from neurotransmitters and GABA receptors (Teicher et al., 2006), and fourth, they modify the production of antibodies and interleukins causing both immunosuppression and immune activation (Leonard, 2000; Raison & Miller, 2001). These changes work well for short-term survival under traumatic situations, but they could cause immunologic problems and predispose children to infectious diseases (Leonard, 2000; Nance, Rayson & Carr, 1987; Raison & Miller, 2001; Shirtcliff et al., 2009).

5.5. Limitations of the Study

The current findings expand our knowledge of the effects of violence on child health in Colombia. However, the following limitations must be noted. First, the research was cross-sectional, so no causal direction should be inferred from detected relationships. The fact that child health symptoms were reported during the two weeks preceding the interview whereas disciplinary practices and intimate partner

violence were reported in the last 12 months, suggests that the independent variables (harsh discipline and intimate partner violence) preceded the dependent variable (poor child health), but it is not conclusive evidence.

Second, variables such as poor child health, harsh discipline, and intimate partner violence were derived exclusively from the mother's report. This information is subject to response bias. It was probably affected by maternal psychological wellbeing. To decrease the effects of this limitation, maternal depression was included in the models as a control variable. Maternal depression helps to control for the psychological state of the mother. Additionally, some mothers may have under-reported physical punishment to their children or intimate partner violence due to the social stigma attached to these practices (Sanchez et al., 2005).

Third, the variables are proxies for the concepts they represent. Poor child health was measured by the number of symptoms reported by the mother, omitting injuries, permanent disability, and mental health problems - all health outcomes that have been associated with domestic violence (Bair-Merritt et al., 2006; Batten et al., 2004; Duran et al., 2004; Feerick & Silverman, 2006; Haj-Yahia et al., 2009; Hillis et al., 2004; Kolko et al., 1999;) and community violence (Haynes et al., 2003; Perez-Olmos et al., 2005; Reading et al., 1999). The symptom count has the benefit of simplicity and is likely to provide a fairly reliable proxy for child health. It assumes that either all symptoms are independent, or, where symptoms may be interdependent in some circumstances (such as a fever and runny nose), the impact on health is twice as great as the presence of either symptom alone (Propper C, 2007). Since the symptoms do not have an identical impact on quality of health, an additional weight

was given to symptoms representing life threatening situations. Additionally, harsh discipline was defined as the use of pushing and/or hitting with objects. This measure ignores verbal harsh discipline as well as the frequency, intensity and targeted body area of the beatings. It also disregards other means of physical punishment such as punching and slapping, among others. The specific characteristics of physical punishment would help to distinguish between discipline and abuse (Barnett et al., 2005; Summers & Hoffman, 2002) and would clarify the level of exposure to violence. Finally, the measure of intimate partner violence did not consider frequency and intensity; their inclusion would help to better understand the household violence environment.

Other limitations of this study include that it was restricted to Colombia, so findings should not be generalized to children living in other countries. Nonetheless, to the extent that other countries in Latin America share many cultural and socio-economic characteristics, including severe income inequalities and high rates of crime and violence (Agrast et al., 2010), it is likely that this study's findings may describe a situation that is common to other countries in the region.

5.6. Future Research

Future research is needed to address the limitations of the study. Future research should further examine the effects of violence on young children's health, employing longitudinal methods, including different health outcomes (symptoms of emotional distress, disability, injuries, and hospitalizations), adding detailed information on domestic violence (frequency and intensity), and using different sources of information (medical/hospital records and forensic reports). It is important

to improve the measures of health and violence, particularly the measure of harsh discipline practices. Studies should incorporate children from different countries or environments, since the effects of violence vary as a function of geography and culture. Future research should explore potential protective factors included in this study (e.g., maternal well-being, health insurance, vaccinations, and maternal education), and incorporate new ones (e.g., social capital, social cohesion, rule of law, community resources, and paternal education). It should use more complex models to identify possible moderating and mediating influences of all these factors. Future research might also explore whether patterns of protective processes differ between boys and girls and for children at different developmental stages.

Protective factors such as religiosity, religious affiliation, availability of social networks, and accessibility to public and community support should be included in future research to improve programmatic and policy recommendations.

Finally, the inclusion of biomarkers will be necessary to test the influence of biological stress in the relationship between violence and health.

5.7. *Programmatic and policy implications*

Despite its limitations, this study presents evidence of the harmful effects that violence has on Colombian children's health. The study points out the need for prevention programs to decrease domestic violence and community violence in the country.

Colombia should develop national and regional action plans against violence. Such plans will require the collaboration of multiple sectors—local governments,

central government, multilateral organizations, private sector, health and social

service providers, courts, churches, and development agencies. They should target

children because the potential to shape attitudes, knowledge and behavior decreases

with age. Home-visitation programs and school-based programs to teach children

social and problem-solving skills are examples of strategies that have shown success

in the reduction of violence (World Health Organization, 2004). These plans should

consider th433 areas of intervention. First is changing cultural and social norms.

There are people in Colombia that still justify intimate partner violence and harsh

discipline of children based on cultural traditions (Abranzon, 2004; Betancourt, 2004)

A second area is the reduction of income, social, and gender inequalities. Poverty was

associated with poor child health in all the studied models. It is necessary to improve

the quality of life of the Colombian population.) A third area is strengthening

communities to decrease unattended basic needs. This study found that unsatisfied

basic needs at the community level predicted child health and helped to explain the

effect of intimate partner violence on child health. It is essential to increase resources

in many communities (World Health Organization, 2004). Since health promotion

and prevention efforts may reduce but not eliminate violence, it is also necessary to

strengthen support and care services for victims (World Health Organization, 2004).

Additionally, the study calls for the implementation of programs and policies

designed to reduce the effects of violence on child health among Colombian children.

Moreover, findings suggest that different intervention efforts may be necessary to

reduce the impact of each form of violence (community violence, intimate partner

violence and severe physical punishing practices) on child health.

The education of young girls should be promoted. Maternal education was a protective factor against the negative effects of violence on child health in all the studied models.

Given that children with employed mothers were less healthy than those of unemployed mothers, it is important to consider extending the duration of maternity leave or make it possible for mothers to take time off from work when needed (family and medical leave). Today Colombia has a maternity leave of three months (Ministerio de la Proteccion Social, 2006). Children need supervision and care from their parents after birth and at other critical periods in their development (World Health Organization, 2004).

Evidence on the association of maternal depression on child health shows the need to provide external support to mothers with young children in Colombia. Strategies such as nurse home visitation (World Health Organization, 2004) or school-based programs (World Health Organization, 2004) have been shown to decrease mothers' stress levels and therefore depression. Colombian mothers need additional supports to parent their children.

Findings are consistent with the idea that family planning should be promoted. The number of household members influences the health status of children. Each additional member of the household decreases the health status of the children by 1%. Additionally, delaying childbearing to older ages should be promoted. Children from older mothers had better health.

The provision of public services in rural communities should be a priority since living in rural areas was associated with worst outcomes.

Finally, the promotion of intact nuclear families will probably help to decrease the negative effects of violence on child health. Children living in intact nuclear families were healthier than those living in other family structures.

5.8. *Conclusion*

The results of this study indicate that violence is negatively related to young Colombian children's physical health. Intimate partner violence is associated with a reduction of 18% and community violence is associated with a reduction of 16% in children's symptoms of poor health. Violence - directly and through its cultural, social, and economic consequences - affects not only the psychological (Perez-Olmos et al., 2005; Sanchez et al., 2005) but also the physical well-being of Colombian children. Violence is a relevant determinant of health.

Other factors that affected the health of Colombian children in all the studied models were: 1) maternal work status (working mothers had less healthy children), 2) maternal depression (children with depressed mothers were sicker), and 3) number of household members (the greater the number of household members the worse the health of the child). Although depression probably influenced maternal reporting of child illnesses, it could also be a determinant of child health.

The results partially support the hypotheses of the association between harsh discipline and child health. The relationship is clear in the family models and disappears in the multilevel models probably for cultural reasons. The community in which families live strongly influences the level of harsh discipline parents use.

This study did not find that community violence affected the relationship between intimate partner violence and child health. However, it did find that a higher

level of unmet needs was associated with a stronger association between intimate

partner violence and child health. This suggests that poverty amplifies the negative

effects of intimate partner violence.

These findings suggest the need to continue studying the effects of community

violence on family behaviors in different populations, as well as to provide support

for efforts to promote violence prevention programs in an effort to improve child

health in Colombia.

Appendices

Appendix 1. Factor Analysis Child Physical Health

Communalities

	Initial	Extraction
Bdiarrhea	1.000	.493
Bfever	1.000	.450
Bcough	1.000	.621
Bmucus	1.000	.623
Bsorethoat	1.000	.474
Bsoreness	1.000	.487
Bswall	1.000	.401
Bbreath	1.000	.589
Bbreath2	1.000	.568
Bblue	1.000	.425
Bsunken	1.000	.548
Bvomit	1.000	.469

Extraction Method: Principal Component
Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.752	31.270	31.270	3.752	31.270	31.270	
2	1.338	11.151	42.421	1.338	11.151	42.421	
3	1.058	8.817	51.238	1.058	8.817	51.238	
4	.946	7.882	59.120				
5	.902	7.516	66.636				
6	.816	6.798	73.434				
7	.681	5.675	79.108				

8	.647	5.390	84.498				
9	.583	4.862	89.360				
10	.471	3.927	93.287				
11	.452	3.766	97.053				
12	.354	2.947	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot
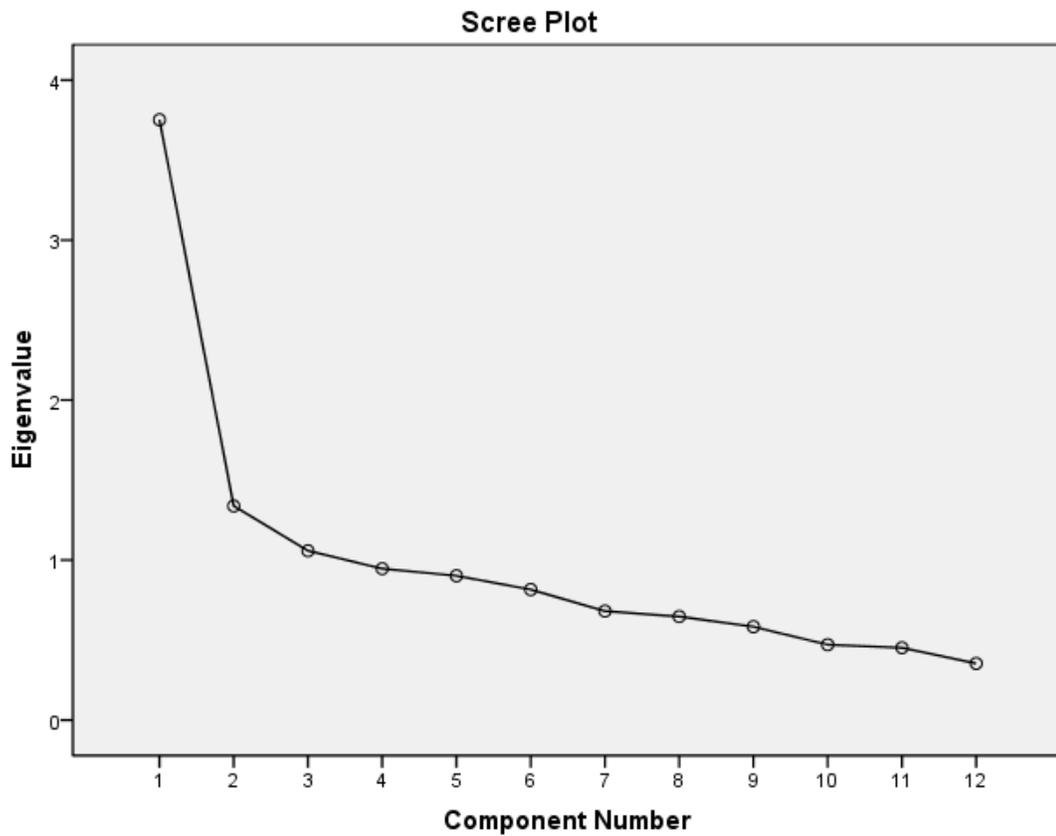
Component Matrix[a]

	Component		
	1	2	3
Bdiarrhea	.282	-.125	.630
Bfever	.584	-.231	.235
Bcough	.669	-.372	-.186
Bmucus	.657	-.388	-.203
Bsorethoat	.662	-.180	-.050

105

	.660	-.151	-.169
Bsoreness	.660	-.151	-.169
Bswall	.630	-.052	.043
Bbreath	.644	.394	-.137
Bbreath2	.612	.410	-.159
Bblue	.352	.510	.203
Bsunken	.466	.572	.065
Bvomit	.226	-.107	.638

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Pattern Matrix^a

	Component		
	1	2	3
Bdiarrhea	.057	.003	.689
Bfever	.501	.018	.457
Bcough	.818	-.093	-.025
Bmucus	.825	-.114	-.039
Bsorethoat	.633	.096	.074
Bsoreness	.657	.121	-.050
Bswall	.488	.210	.137
Bbreath	.268	.651	-.125
Bbreath2	.243	.652	-.154
Bblue	-.155	.649	.153
Bsunken	-.059	.755	.018
Bvomit	.000	-.002	.686

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser
Normalization.

a. Rotation converged in 6 iterations.

Component Correlation Matrix

Component	1	2	3
1	1.000	.330	.178
2	.330	1.000	.157
3	.178	.157	1.000

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Appendix 2.

Bivariate Correlations of Respiratory Infection, Diarrhea and Serious Infection with All Other Variables in Level 1						
	Respiratory infection	Sig	diarrhea	Sig	Serious infection	Sig
Respiratory infection	1					
diarrhea	0.27	***	1			
Serious infection	0.33	***	0.25	***	1	
Harsh Discipline	0.00		-0.01		-0.01	
Intimate Partner Violence	0.00		0.00		0.00	
Child Age (in Months)	0.00		-0.01		0.01	
Child Sex (Boys=1)	0.00		-0.02	*	-0.01	
Child Health Insurance	-0.01		-0.01		-0.01	
Child Complete Vaccines	0.01		0.01		0.00	
Maternal Education (# of Years)	-0.01		-0.01		0.00	
Maternal Age (in Years)	-0.02	†	-0.02	†	-0.01	†
Maternal Work Status (Works=1)	-0.01		0.00		-0.01	
Maternal Depression	-0.01		0.00		0.00	
Number of Household Members	0.00		0.00		0.00	
Type of family (Nuclear=1)	0.00		0.01		0.00	
Household Wealth Index	0.06	***	0.07	***	0.06	***
Migration	0.00		-0.01		-0.01	
Type of Residence (Urban=1)	0.01		0.01		0.00	
*** p<.001, **p<.01, *p<.05, †<.10						

Appendix 3. Factor Analysis Intimate Partner Violence

Communalities

	Initial	Extraction
Last year husband: accused of not being faithful	1.000	.418
Last year husband: didn't allow to see friends	1.000	.497
Last year husband: limited contact with family	1.000	.425
Last year husband: wanted to know where she was at all times	1.000	.460
Last year husband: controlled the way you spend money	1.000	.363
Last year husband: ignored you/didn't address you	1.000	.383
Husband uses expressions like: you are good for nothing, nev	1.000	.390
Last year husband threatened with: abandoning her/go away wi	1.000	.362
Last year husband threatened with: take away children	1.000	.421
Last year husband threatened with: withdraw economic support	1.000	.407
Last year husband did: push, shake	1.000	.539
Last year husband did: hit with hand	1.000	.561
Last year husband did: hit with an object	1.000	.551

Last year husband did: bite	1.000	.364
Last year husband did: kick/drag	1.000	.569
Last year husband did: threaten with knife, gun, other weapo	1.000	.565
Last year husband did: attack with knife, gun, other weapon	1.000	.483
Last year husband did: try to strangle, burn	1.000	.413
Last year husband did: physically force for unwanted sex act	1.000	.376

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rota
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	6.357	33.457	33.457	6.357	33.457	33.457	4.36
2	1.850	9.738	43.195	1.850	9.738	43.195	3.83
3	1.124	5.915	49.109				
4	.919	4.839	53.948				
5	.830	4.369	58.317				
6	.801	4.215	62.532				
7	.718	3.777	66.309				
8	.705	3.708	70.018				
9	.686	3.613	73.631				
10	.656	3.452	77.082				
11	.625	3.288	80.370				
12	.606	3.192	83.562				
13	.548	2.882	86.444				
14	.535	2.817	89.261				
15	.502	2.644	91.905				
16	.449	2.365	94.270				

17	.447	2.353	96.623				
18	.371	1.952	98.576				
19	.271	1.424	100.000				

Extraction Method: Principal Component Analysis.

Scree Plot
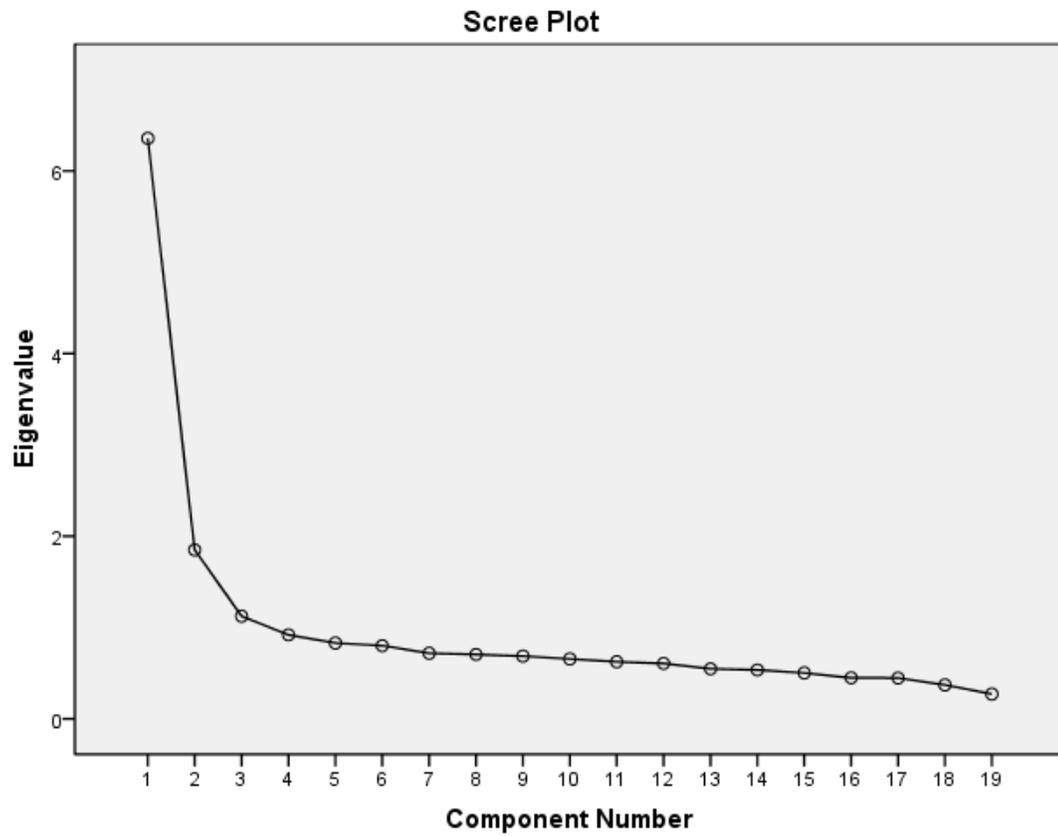
Component Matrix[a]

	Component	
	1	2
Last year husband: accused of not being faithful	.574	.297
Last year husband: didn't allow to see friends	.602	.366

110

Last year husband: limited contact with family	.594	.270
Last year husband: wanted to know where she was at all times	.539	.412
Last year husband: controlled the way you spend money	.499	.338
Last year husband: ignored you/didn't address you	.520	.335
Husband uses expressions like: you are good for nothing, nev	.499	.202
Last year husband threatened with: abandoning her/go away wi	.566	.205
Last year husband threatened with: take away children	.539	.175
Last year husband threatened with: withdraw economic support	.617	.162
Last year husband did: push, shake	.733	-.034
Last year husband did: hit with hand	.729	-.173
Last year husband did: hit with an object	.622	-.405
Last year husband did: bite	.388	-.337
Last year husband did: kick/drag	.669	-.349
Last year husband did: threaten with knife, gun, other weapo	.605	-.445
Last year husband did: attack with knife, gun, other weapon	.487	-.495
Last year husband did: try to strangle, burn	.527	-.368

| Last year husband did: physically force for unwanted sex act | .571 | -.098 |

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Rotated Component Matrix^a

	Component	
	1	2
Last year husband: accused of not being faithful	.626	.159
Last year husband: didn't allow to see friends	.694	.126
Last year husband: limited contact with family	.623	.193
Last year husband: wanted to know where she was at all times	.677	.050
Last year husband: controlled the way you spend money	.598	.079
Last year husband: ignored you/didn't address you	.611	.095
Husband uses expressions like: you are good for nothing, nev	.507	.180
Last year husband threatened with: abandoning her/go away wi	.559	.223
Last year husband threatened with: take away children	.519	.228
Last year husband threatened with: withdraw economic support	.569	.289
Last year husband did: push, shake	.326	.512

Last year husband did: hit with hand	.430	.613
Last year husband did: hit with an object	.195	.716
Last year husband did: bite	.066	.510
Last year husband did: kick/drag	.268	.705
Last year husband did: threaten with knife, gun, other weapo	.157	.735
Last year husband did: attack with knife, gun, other weapon	.035	.694
Last year husband did: try to strangle, burn	.149	.625
Last year husband did: physically force for unwanted sex act	.362	.452

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Component Transformation Matrix

Component	1	2
1	.747	.664
2	.664	-.747

Extraction Method: Principal

Component Analysis.

Rotation Method: Varimax with Kaiser

Normalization.

Appendix 4. Distribution of Community Violence as a Continuous Variable

Mean = 0.77
Std. Dev. = 0.642
N = 230
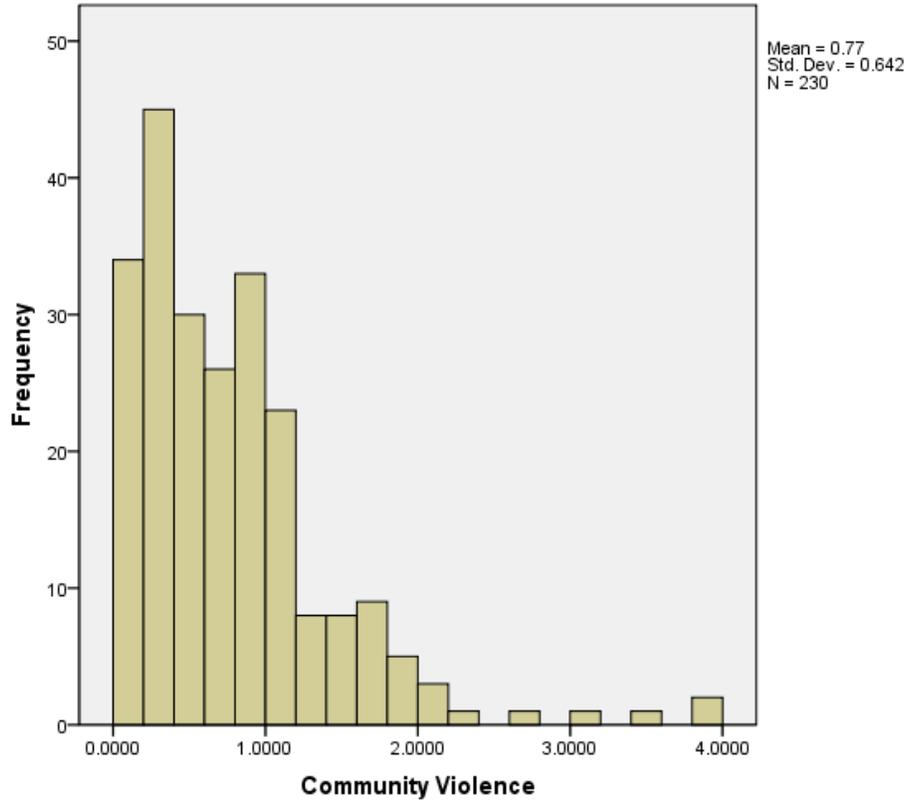
Appendix 5. University of Maryland IRB Exemption

UNIVERSITY OF MARYLAND
INSTITUTIONAL REVIEW BOARD

Date:	November 9, 2010
To:	Sandra Hofferth, PhD Professor Department of Family Science University of Maryland College Park
Cc:	Angela M. Pinzon-Rondon Graduate Assistant Department of Family Science University of Maryland College Park
From:	Joseph M. Smith, MA, CIM IRB Manager University of Maryland, College Park
Re:	Request for Human Subject Research Determination
Title:	"The Effects of Violence on Young Children's Physical Health in Colombia"

The request for determination of Non Human Subject Research for the above-cited project has been reviewed by the University of Maryland College Park Institutional Review Board Office. According to the information provided, it has been determined that this project does not meet one or both of the following definitions and therefore does not require further evaluation by the University of Maryland College Park Institutional Review Board.

§46.102 - (d) *Research* means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge.

§46.102 - (f) *Human subject* means a living individual about whom an investigator (whether professional or student) conducting research obtains:

(1) Data through intervention or interaction with the individual, or
(2) Identifiable private information.

If the scope of your project changes and meets one of the above definitions, an IRB protocol must be created and submitted to the UMCP IRB for approval. For further clarification, questions or concerns please contact the IRB Office at 301-405-0678.

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