Do South African Mothers Shake Their Babies? Incidence and Risk Factors for Infant Abuse in Cape Town

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COMPULSORY DECLARATION

This work has not been previously submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works, of other people has been attributed, and has been cited and referenced.

Signature: Signed by candidate Date: 29 January 2019

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Finally, Philippians 4:13: “I can do all things through Christ who gives me strength.”

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Abstract

Abusive head trauma from shaking is a recognised common cause of fatal head injury in young children globally, although there is little evidence of its occurrence in South Africa. This is perplexing given that the country has amongst the highest reported under-five child mortality and infanticide rates worldwide. To determine whether infants under one-year are violently shaken, a cross-sectional study was conducted with 385 mothers and other primary female caregivers (ages 18 to 60 years; mean age = 27 years) from three high-risk communities in Cape Town. Semi-structured interviews were used to examine: (1) the incidence of shaking, (2) the triggers for shaking, (3) the risk factors for shaking, thoughts of shaking, and knowledge of the dangers of shaking, and (4) the methods used to console crying infants. Results showed that 13.2% (*n* = 51) of all participants self-reported violent shaking, and 20% (*n* = 77) had thoughts of shaking their infants. Following a content analysis, three primary triggers for shaking were identified, these were: inconsolable infant crying, feeling angry or frustrated, and being stressed. Findings from a thematic analysis also showed that shaking occurred during a momentary loss of control, and participants seemed to have limited support at the time. The results from three hierarchical logistic regression analyses showed that (1) alcohol use, infant age, a lower knowledge of the dangers of shaking, inconsolable crying, and having thoughts of shaking, predicted shaking, (2) caregiver age, infant age, knowledge of the dangers of shaking, and caregiver responses to infant crying, predicted having thoughts of shaking, and (3) social support, caregiver history of childhood abuse, and having thoughts of shaking, predicted knowledge of the dangers of shaking. Finally, a content analysis revealed three protective factors for infant crying, these were: (1) having easy, contented children, (2) not feeling stressed in response to infant crying, and (3) leaving an infant alone to self-soothe. Taken together, the current findings have programmatic implications that may help prevent the violent shaking of young children in South Africa.

Introduction

Globally, child protection is a fundamental human right for every child and is enshrined in legally binding agreements such as the United Nations Convention of the Rights of the Child (Department of Social Development, Department of Women, Children and People with Disabilities, & UNICEF, 2012) and the African Charter on the Rights and Wellbeing of the Child (Organisation of African Unity, 1990). Violence negates children's rights to be protected from all types of harm, and the state, therefore, has a duty to prevent violence against children (Mathews & Benvenuti, 2014). In South Africa, this right is enshrined in the Bill of Rights in the Constitution (Act No. 108 of 1996).

One form of violence against children is child maltreatment; the World Health Organization defines this as:

> All forms of physical and/or emotional ill-treatment, sexual abuse, neglect, negligent treatment, commercial or other exploitation, resulting in actual or potential harm to the child's health, survival or development in the context of a relationship or responsibility, trust or power. (Krug, Dahlberg, Mercy, Zwi, & Lozano, 2002, p.59)

Abusive head trauma is the leading cause of fatal head injury in children under two-years-old in many high-income countries, including for example, the United Kingdom (Jayawant et al., 1998) and the United States (Cooper, Szyld, & Darden, 2016; Gill et al., 2009). Reported incidence rates have shown to range between 11.2 to 40 cases per 100,000 children under-two (Barlow & Minns, 2000; Dias et al., 2005), with greater incidence in children under one-year (Keenan et al., 2003; Talvik et al., 2006). The mortality associated with abusive head trauma is high, ranging between 15 and 31% (Fanconi & Lips, 2010; Talvik et al., 2006). For children who survive their injuries, they often have serious, long-lasting physical, cognitive, and neurological disabilities (Blumenthal, 2002; Jenny, Hymel, Ritzen, Reinert, & Hay, 1999), and associated economic costs are high (Peterson et al., 2014).

There are long-standing debates regarding the precise cause of abusive head trauma (Dias, 2010; Duhaime et al., 1987), although the vigorous, manual shaking of young children by the torso, extremities, or shoulders (Blumenthal, 2002; Colbourne, 2015) is one recognised pathway (Adamsbaum, Grabar, Mejean, & Rey-Salmon, 2010; Arbogast, Margulies, & Christian, 2005; Dias, 2010).

There is a wealth of international research on abusive head trauma from shaking, although most data come from high-income countries (Altimier, 2008; Barr, Trent, & Cross, 2006; Bechtel et al., 2011; Keenan & Leventhal, 2010; Sieswerda-Hoogendoorn, Boos, Spivack, Bilo, & van Rijn, 2012; Taşar et al., 2015). This contrasts to the paucity of research (Le Roux-Kemp & Burger, 2014) as well as the lack of recorded instances of shaking in

South Africa (Fieggen et al., 2004).

This is puzzling because South Africa has high rates of violence against children (Seedat, Van der Niekerk, Jewkes, Suffla, & Ratele, 2009), and the "child homicide rate is more than double the global average" (Mathews & Gould, 2017, p. 61). Recent estimates also show that the under-five mortality rate, defined as the number of deaths per 1,000 live births, and the infanticide rate, defined as the killing of a child under age one (Abrahams et al., 2016) are substantially higher in South Africa in comparison to countries that report high incidence rates of abusive head trauma from shaking (The United Nations Inter-agency Group for Child Mortality Estimation, 2018). In line with this reasoning, one might reasonably expect to find evidence of violent shaking in South Africa, if not higher incidence rates.

To address this gap in the literature, an initial exploration into the subject of abusive head trauma was conducted. Specifically, I co-supervised two honours projects from the University of Cape Town. To determine if children under three-years-old suffered abusive head trauma from violent shaking, two retrospective reviews were conducted. The first study was a review of trauma-related records from the Red Cross War Memorial Children's Hospital in Cape Town, South Africa, for all children who presented injured but alive to hospital (Mattes, 2016). For the second project, court inquest records were examined to determine if shaking was concealed within fatal child maltreatment (Chibambo, 2016).

To compliment these studies, the present novel research aimed to investigate if mothers and other primary female caregivers from three high-risk communities in the greater Cape Town area have violently shaken their infants under one-year-old, as well as aimed to identify associated risk factors. The findings from this research are presumed to have important programmatic implications with regard to the prevention of shaking as a form of child maltreatment.

Chapter 1: Literature Review

Abusive Head Trauma: Definition and Diagnosis

In recent years, the American Academy of Pediatrics recommended using the term abusive head trauma to describe the constellation of intracranial[1] and intraocular[2] injuries formerly known as shaken baby syndrome (Christian, Block, & Committee on Child Abuse and Neglect, 2009). Owing to on-going debates regarding the precise mechanism of injury (Kemp, Stoodley, Cobley, Coles, & Kemp, 2003), abusive head trauma is a more inclusive term to describe non-accidental head injury in young children that can result from shaking, impact trauma[3], or a combination thereof (Christian et al., 2009; Mann, Rai, Sharif, & Vavasseur, 2015). Regarding shaking, it is defined as the vigorous, manual shaking of young children by the torso, extremities, or shoulders (Fulton, 2000).

Although debated (Gabaeff, 2011; Lynøe et al., 2017), there is evidence to suggest that the presence of a triad of symptoms, typically occurring in the absence of external signs of injury, increases the probability of a correct diagnosis of abusive head trauma (Matschke et al., 2009a). The triad of symptoms includes: subdural haemorrhage[4] (Brennan et al., 2009; Levin, 2003), retinal haemorrhage[5] (Bhardwaj et al., 2010; Colbourne, 2015; Forbes, Rubin, Margolin, Dipl, & Levin, 2010; Maguire et al., 2013) and encephalopathy[6] (Squier, 2011). In addition to this triad, children often have rib fractures and can present with neurological manifestations that range from non-specific to life-threatening (Matschke et al., 2009a). For example, non-specific signs of abusive head trauma can include, but are not limited to, vomiting, lethargy, and irritability, whereas more serious signs may include the convulsing, shocked, and unconscious child (Blumenthal, 2002).

While the presence of the triad increases the probability of a correct diagnosis of abusive head trauma, one caution is that other possible differential diagnoses may explain symptoms of the triad (Sieswerda-Hoogendoorn et al., 2012), including for example, accidental trauma, motor vehicle accidents, and coagulation, metabolic, or infectious disorders (David, 2008). Therefore, differential diagnoses need to be ruled out before non-accidental trauma can be considered (Sieswerda-Hoogendoorn et al., 2012).

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[1] Within the skull.
[2] Within the eye.
[3] Non-penetrating physical trauma to the body.
[4] A collection of blood between the skull and the surface of the brain (Squier, 2011).
[5] Bleeding of the blood vessels in the retina, the membrane at the back of the eye.
[6] Brain disease, damage, or malfunction.

Mechanism of Injury and Susceptibility to Abusive Head Trauma

Translational and rotational forces are two forces that can lead to head injury (Blumenthal, 2002). Translational forces, which occur during falls, produce linear movements of the brain and primarily lead to accidental head injury (Blumenthal, 2002). Rotational forces, which occur during shaking, "cause the brain to rotate on its central axis or at the attachment of the brainstem", and most often result in non-accidental head injury (Blumenthal, 2002, p. 732). Shaking can also be described as an acceleration-deceleration mechanism, whereby the brain bounces back and forth against the skull, causing injury (Matschke et al., 2009a). Infants are most vulnerable to acceleration-deceleration events with a marked rotatory component (Matschke et al., 2009a) because their "heads are disproportionately heavy relative to their small bodies, the neck muscles are weak, the brain is soft, and the base of the skull is flat" (Byard, 2014, p. 239). For these reasons, it is, therefore, not surprising that the American Academy of Pediatrics stated that "the act of shaking leading to abusive head trauma is so violent that individuals observing it would recognise it as dangerous and likely to kill a child" (American Academy of Pediatrics Committee on Child Abuse and Neglect, 2001, p. 206).

Consequences of Abusive Head Trauma

Death from abusive head trauma is the most extreme consequence of recognised inflicted head injury in young children. Several international studies have shown that mortality rates range between 15 and 31% in children mostly under-two in high-income countries like Canada (King, MacKay, Sirnick, & the Canadian Shaken Baby Study Group, 2003), Europe (Adamsbaum et al., 2010; Talvik et al., 2006), Switzerland (Fanconi & Lips, 2010), the United Kingdom (Hobbs, Childs, Wynne, Livingston, & Seal, 2005; Jayawant et al., 1998), and the United States (Jenny et al., 1999; Keenan et al., 2003).

For children who do survive abusive head trauma, they often have serious long-term morbidity outcomes (Sieswerda-Hoogendoorn et al., 2012), including physical and development delays (Barlow, Thomson, Johnson, & Minns, 2005; Ewing-Cobbs et al., 1998; Talvik et al., 2006), as well as neurological or cognitive dysfunction (Blumenthal, 2002; Forbes et al., 2010; Jayawant et al., 1998). Morbidity rates are high across studies, and have shown to range between 62 and 96% (Barlow et al., 2005; Jonsson, Horneman, & Emanuelson, 2004; Matschke et al., 2009b).

Several studies provide empirical support for the high morbidity associated with abusive head trauma in young children. For example, in a nationwide, prospective study conducted in Switzerland, detailed follow-up information was available for 39 infants who survived abusive head trauma (Fanconi & Lips, 2010). Of these survivors, 11 infants (28%)

were severely disabled; they had "cognitive scores in the deficient range, severe motor deficits, or were referred to inpatient rehabilitation" (Fanconi & Lips, 2010, p. 1024). A further 14 infants (36%) were moderately disabled, meaning that they "had a significant reduction in cognitive functioning, motor deficiencies, or were referred to an outpatient rehabilitation centre" (Fanconi & Lips, 2010, p. 1024).

In another prospective, population-based study in Estonia, the long-term neurological and developmental prognosis of 22 children (18 boys, 4 girls) diagnosed with abusive head trauma during infancy was conducted (Talvik et al., 2007). At follow-up, only 17 of the 22 children (77%) were eligible for assessment, as the remaining five children (23%) were seriously impaired or too young to be assessed (Talvik et al., 2007). Based on the Kaufman Assessment Battery for Children – a measure designed to assess children's intelligence and achievement – 77.5% of all children "had some degree of neurological and/or developmental problems" at follow-up 4.3 years later (Talvik et al., 2007, p. 1166). These problems included, but are not limited to, mixed specific developmental disorders (50%), epilepsy (32%), severe motor disturbances (22%), and unspecified mental retardation (14%; Talvik et al., 2007). The study concluded that children who suffered abusive head trauma during infancy presented with functional disturbances later on in life that had prognostic value for educational achievements (Talvik et al., 2007). A host of other empirical evidence further corroborates the high morbidity associated with abusive head trauma in young children (Barlow et al., 2005; Duhaime, Christian, Moss, & Seidl, 1996; Ewing-Cobbs et al., 1998; Haviland & Russell, 1997; Jayawant et al., 1998; Jenny et al., 1999; King et al., 2003).

Of concern, current morbidity rates are thought to be underestimated (Talvik et al., 2007). Depending on the severity of abusive head trauma, children can appear to be fine immediately after the trauma, particularly in milder cases (Talvik et al., 2007). This is because a symptom-free interval is thought to occur because children have developing, malleable brains (Talvik et al., 2007), and disabilities may, therefore, only become apparent when children fail to reach age-appropriate developmental milestones (Bonnier, Nassogne, & Evrard, 1995). In support of this argument, one study found that in the acute period following abusive head trauma, six of 22 infants (27%) had chronic subdural haemorrhages without being in a life-threatening condition (Talvik et al., 2006). At follow-up (range: 2.3 to 8.6 years), however, only two infants (9%) had no developmental problems (Talvik et al., 2007).

Clearly, abusive head trauma has devastating personal costs for children who do survive, and the economic costs for the families of affected children and the broader society are also high (Dias et al., 2005). Specifically, a study in the United States found that the average total "medical cost attributable to abusive head trauma in the four years post-

diagnosis was $47,952 per patient" in 2012 (South African rand equivalent = R416,702; Peterson et al., 2014, p. 91). "These estimates exclude related nonmedical costs such as special education and disability that are attributable to abusive head trauma" (Peterson et al., 2014, p. 91).

Because abusive head trauma in young children can lead to lasting impairment, the issue of misdiagnosis is cause for concern (Forbes et al., 2010). One possible reason for misdiagnosis is that the symptoms of abusive head trauma can range from non-specific to life-threatening (Fanconi & Lips, 2010; Matschke et al., 2009a), and cases can be easily misinterpreted for less serious conditions, like viral gastroenteritis (Jenny et al., 1999). To highlight the costs of misdiagnosis, one study in Colorado identified 54 cases (31.2%) of missed abusive head trauma in children under age three (Jenny et al., 1999). Children were evaluated by a healthcare practitioner several times (range: two to nine visits) before the correct diagnosis was made (Jenny et al., 1999), and as a result, nearly one third of all children (n = 15) were re-injured, and five children (9.3%) died.

Incidence of Abusive Head Trauma

Incidence rates of abusive head trauma are primarily from studies that have been conducted in high-income countries, these include: Canada (King et al., 2003), France (Adamsbaum et al., 2010), Estonia (Talvik et al., 2007), Switzerland (Fanconi & Lips, 2010), the United Kingdom (Hobbs et al., 2005; Kemp et al., 2003), and the United States (Gill et al., 2009; Keenan et al., 2003). Among these studies, incidence rates have been shown to range between 11.2 to 40 cases per 100,000 children under-two (Barlow & Minns, 2000; Dias et al., 2005), with greater incidence in infants under one-year (Talvik et al., 2006).

One study provides some insight into why reported rates may vary. Specifically, a nationwide study in Estonia found that incidence rates were lower in a retrospective review than in a prospective study of abusive head trauma; these rates were 13.5 and 40.5 per 100,000 children under one-year, respectively (Talvik et al., 2006). From these findings, it can be postulated that the incidence of abusive head trauma is increasing in young children, that study design may influence reported rates, or alternatively, that it is easier to diagnose abusive head trauma when studied prospectively; possibly because collateral information is more readily available (e.g., perpetrator confessions).

There is reason to suspect that incidence rates are, however, underestimated (Sieswerda-Hoogendoorn et al., 2012). To support this, research has shown that not all infants who are shaken come into contact with the medical system (Runyan et al., 2010), and shaking is often an acceptable disciplinary practice in countries like Chile and India (Runyan, Wattam, Ikeda, Hassan, & Ramiro, 2002; Sadowski, Hunter, Bangdiwala, & Muñoz, 2004).

Additionally, misdiagnosis is common (Jenny et al., 1999), and caregivers may conceal fatal abusive head trauma if abuse is intentional (King et al., 2003). For these reasons, many children may not be represented in incidence rates, meaning that abusive head trauma among young children may be more prevalent than current literature suggests.

In comparison to international evidence, there is no established incidence rate for abusive head trauma from shaking in South Africa. This is despite the fact that levels of violence against children are extremely high in the country (Seedat et al., 2009). In an attempt to provide clarification for this gap in the literature, two studies were recently conducted to determine whether young children in South Africa do suffer abusive head trauma from shaking (Chibambo, 2016; Mattes, 2016).

A retrospective review of court inquest records. A 10-year retrospective review (occurring between 2006 and 2016) of court inquest records from three Magistrates' courts was conducted to identify if shaking contributed to fatal child maltreatment in children under three years in Cape Town, South Africa (Chibambo, 2016). Inquest records are completed for any unnatural death, and entail a comprehensive medico-legal examination (Chibambo, 2016). The premise underlying this research was that there is a discrepancy between expected rates of fatal abusive head trauma from shaking in South Africa and international research. Specifically, international studies have shown fairly consistent abusive head trauma mortality rates of between 15 to 23% (Fanconi & Lips, 2010; Hobbs et al., 2005; Keenan et al., 2003; Talvik et al., 2006), although there are no reported cases in reviews of South African data (Abrahams et al., 2016; Mathews, Abrahams, Jewkes, Martin, & Lombard, 2013). Because the child homicide rate in South Africa is double the global average (Mathews & Gould, 2017), the study expected to find evidence of death from shaking.

In the study, the three Magistrates' courts were located in areas of close proximity to communities considered to be at high-risk for child maltreatment. This was because the communities were characterised by high levels of disadvantage, and for this reason, were likely associated with several risk factors that together increased the risk for maltreatment (Department of Social Development et al., 2012). Some of these factors included, but were not limited to, high levels of alcohol use (World Health Organization, 2006), community violence (Ceballo & McLoyd, 2002), and poverty (Farrell et al., 2017).

Of 408 registered deaths in children under three years old between 2006 and 2016, a total of 395 (96.8%) inquest records were examined. Thirteen records (3.2%) could not be examined because in three cases, the investigation was pending, and a further ten records were missing (Chibambo, 2016). A total of 47 cases (11.6%) were identified as cases that

may have concealed fatal abusive head trauma from shaking, however, 10 of these 47 cases (21.3%) were those records that were missing; and hence could not be examined.

The study concluded that there was no evidence to support that shaking caused or contributed to recognised fatal child maltreatment in South Africa, as determined from court inquest records (Chibambo, 2016). Six cases (1.5%) did, however, raise the index of suspicion for death from shaking based on the presence of one or more pathological correlates of the abusive head trauma triad, i.e., subdural haemorrhage, retinal haemorrhage, and encephalopathy (Chibambo, 2016).

Of these six cases, all victims were male (100%). In two cases (33.3%), the caregiver claimed that the child died as a result of falling, and in another case (16.7%), the mother claimed that her child died from unassisted birth-related trauma (Chibambo, 2016). These findings are consistent with trends in the literature which have shown that boys are most commonly the victims of shaking (Nuño, Pelissier, Varshneya, Adamo, & Drazin, 2015; Talvik et al., 2006), and that perpetrators often describe a relatively small trauma (e.g., fall from a couch), or no preceding trauma at all (Hettler & Greenes, 2003; Sieswerda-Hoogendoorn et al., 2012). The study concluded that the reasons for death were inconsistent with the observed injuries in the six cases (1.5%), and ultimately raised the suspicion of death from violent shaking.

A retrospective review of the ChildSafe database. To determine the frequency of abusive head trauma from shaking in children under age three who presented injured, but alive to a hospital in South Africa, and to identify associated risk or protective factors, a 20-year retrospective review was conducted (Mattes, 2016). The premise for the research was that many children survive being shaken, therefore, reviews of medical records are necessary (Mattes, 2016). Data was obtained from the ChildSafe South Africa database; "one of the largest paediatric injury databases worldwide" (Mattes, 2016, p. 14). Using a trauma unit record form, information for each patient presenting to the trauma unit at the Red Cross War Memorial Children's Hospital is systematically recorded into the database (Mattes, 2016). Because the Red Cross Hospital is "the only dedicated children's hospital in South Africa" (Mattes, 2016, p. 14), it was postulated that evidence of abusive head trauma from shaking would most likely be found here.

A total of 52,165 injuries were reported for all children under age three between 1996 and 2015. Of note, injuries in the database were recorded on an injury-by-injury basis, meaning that each injury represented an anatomical injury and not an individual child or single event (Mattes, 2016). Overall, only three cases (less than 0.01%) of explicit shaking were reported, and one of these cases resulted in a closed tissue injury to the eye (Mattes,

2016) – possibly showing evidence of retinal haemorrhage; a component of the abusive head trauma triad. These three cases were only identified as a result of doctor's additional comments on the trauma unit form, meaning that other cases of shaking may have existed where testimony or witness accounts of shaking were not forthcoming (Mattes, 2016).

To examine the implicit evidence of abusive head trauma from shaking, all head injuries within cause-of-injury categories that might have concealed abusive head trauma from shaking were examined (Mattes, 2016). Owing to the occult nature of abusive head trauma (Carbaugh, 2004; Mattes, 2016), it can be concealed within other cause-of-injury categories (Bilo, Robben, & van Rijn, 2010; Squier, 2011), making it harder to detect.

A total of 30,142 injuries were, therefore, reviewed from four cause-of-injury categories, these were: falls, miscellaneous injuries, unknown injuries, and injuries from assault (Mattes, 2016). Of this sub-group, head injuries accounted for 7,004 (23.2%) injuries, and an additional 21 cases of eye injury related to head injury were identified – possibly showing evidence of subdural and/or retinal haemorrhages (Mattes, 2016). Boys (59.3%, n = 4,154) were more likely than girls (40.3%, n = 2,823) to suffer head injury, and infants between 6 to 11 months were most commonly injured (22.7%, n = 1593; Mattes, 2016). Intimate partner violence and alcohol or drug use were identified as risk factors for head injuries, and one single case of reported shaking (0.01%) resulted in head injury (Mattes, 2016). The study concluded that owing to a number of limitations of the ChildSafe database, any number of abusive head trauma cases from shaking might have been concealed within the 7,004 head injuries and the 21 eye injuries related to head injury (Mattes, 2016).

In conclusion, the two retrospective reviews did not show any overt evidence of abusive head trauma from shaking among children under age three in South Africa. These findings contrast to international retrospective reviews which provide clear evidence of abusive head trauma from shaking (Adamsbaum et al., 2010; Starling et al., 2004).

The Conundrum

It is difficult to determine the true extent of child mortality and/or homicide rates in South Africa because there is no single system that adequately represents child deaths (Nannan et al., 2012). Despite this shortfall, South Africa still has amongst the highest recorded under-five mortality rate (37 deaths per 1,000 live births; The United Nations Inter-agency Group for Child Mortality Estimation, 2018) and infanticide rate (the killing of a child under-one; 28.4 per 100,000 live births) in the world (Abrahams et al., 2016). From this perspective, the paucity of recorded instances of abusive head trauma from shaking in South Africa is quite puzzling, particularly since incidence rates of abusive head trauma are high in countries that have significantly lower child mortality and/or homicide rates. For example,

mortality estimates for 2017 show that the under-five mortality rate, defined as the number of deaths per 1,000 live births, was substantially higher in South Africa (*n* = 37) compared to countries where abusive head trauma from shaking is recognised, e.g., Canada (*n* = 5), Estonia (*n* = 3), the United Kingdom (*n* = 4), and the United States (*n* = 7; The United Nations Inter-agency Group for Child Mortality Estimation, 2018).

The Risk Factors for Violent Shaking

A risk factor is an event or situation that is linked to "an increased likelihood of a poor outcome", even though the risk factor itself may not be "causally related to the problem" (Makoae, Dawes, Loffell, & Ward, 2008, p. 19). This means that for any given problem, risk factors can be useful to identify high-risk groups that would benefit from a targeted intervention (Kirby, 2001; Makoae et al., 2008).

Bronfenbrenner's ecological systems theory. Violence against children is a complex phenomenon (Mathews & Benvenuti, 2014), meaning that there is no single explanation why some children are maltreated and others aren't. Bronfenbrenner's ecological systems theory (Bronfenbrenner, 1979) is one framework that can be used to show how certain risk factors increase the likelihood that young children may be violently shaken. The premise underlying this framework is that nested environments interact to influence development throughout a child's lifetime (Handley, Rogosch, Guild, & Cicchetti, 2015; Ward et al., 2012a). From this perspective, violence against children is shaped by a complex interplay of risk factors that interact with the child across four levels of influence, viz., individual characteristics, relationships, the community, and wider society (Handley et al., 2015; Mathews & Benvenuti, 2014; Ward et al., 2012a). "These levels thus range from the proximal child environment to more distal influences" (Stith et al., 2009, p. 15). Using this framework, known risk factors for shaking are discussed, and the more general risk factors for child maltreatment are also considered in terms of their applicability to the risk for shaking.

Individual level: infant risk factors.

Inconsolable crying. It is well established in the literature that prolonged, inconsolable bouts of crying are the primary trigger that lead to violent shaking (Barr et al., 2006; Centers for Disease Control and Prevention, 2014; Mann et al., 2015; Russell, 2010; Talvik et al., 2006). Inconsolable crying increases the risk for fatal child maltreatment (Palusci & Covington, 2014) and violent shaking because it can provoke in caregivers high levels of anger and/or frustration (Barr et al., 2009a; Le Roux-Kemp & Burger, 2014), and which left unmanaged, can lead to violence towards children. To support this, one study showed that perpetrators admitted to shaking their children because they "lost control" or "snapped" when the infant would not stop crying (Lazoritz & Palusci, 2001).

Inconsolable crying can be an unpleasant experience, and the risk for shaking might also be higher if caregivers have unrealistic expectations of infant crying, including the duration of time that newborns can cry for. To support this, the findings from one study showed that the duration of an infant's crying was less important than the parents' perceptions of what they regarded to be excessive crying (Reijneveld, van der Wal, Brugman, Hira Sing, & Verloove-Vanhorick, 2004). Similarly, another study found that 88.5% (n = 23) of parents with children who suffered abusive head trauma injuries contacted their family physician because of excessive crying before the child was injured (Talvik et al., 2006).

Infant age. Because infants (i.e., younger than 12 months old) and young children cry to communicate (Kim, 2011), and because the literature clearly shows that inconsolable crying is the primary trigger for violent shaking (Centers for Disease Control and Prevention, 2014; Colbourne, 2015; Gill et al., 2009), infants are for these reasons at highest risk of being shaken. In support of this, a host of research has shown that abusive head trauma injuries (including from shaking) occur most frequently in children younger than one year old (Barlow & Minns, 2000; Cooper et al., 2016; Dias et al., 2005; Gill et al., 2009).

In considering other explanations, infants cannot be reasoned with or protect themselves (Department of Social Development et al., 2012), meaning that caregivers may feel limited in their strategies to respond to young children, and thus more likely to use physical discipline. To support this, several studies have shown that younger children are more likely than older children to suffer intentional abuse (Bilo et al., 2010; Hettler & Greenes, 2003; Sieswerda-Hoogendoorn et al., 2012). In one study of traumatic brain injury in Texas, for example, the average age of children who suffered abusive head trauma injuries was 11 months, whereas the average age of children with accidental head injuries was three years old (Ewing-Cobbs et al., 1998). Together, the findings show that children are more vulnerable to being shaken when they are younger.

Infant gender (male). A trend throughout the literature is that boys are at greatest risk for violent shaking (Barlow & Minns, 2000; Department of Social Development et al., 2012; King et al., 2003; Mattes, 2016; Nuño et al., 2015). The highest identified risk was from a study in Estonia where male infants were at least three times more likely than female infants to suffer abusive head trauma injuries (Talvik et al., 2006). These findings align with trends in child maltreatment literature more broadly, and show that "male children appear to be at greater risk of physical abuse" (Krug et al., 2002, p. 66).

Clearly, gender seems to be a strong predictor of future physical abuse in boys, although the reasons for this finding are unclear (Krug et al., 2002). Some suggestions that have been made are that boys are thought to need more corporal punishment (Janssen, van

Dijk, Malki, & van As, 2013), and that culture might influence the values that are attached to male and female children (Krug et al., 2002). This means that caregivers who believe that boys are stronger and can withstand rougher handling (Showers, 1992), may be more likely to violently shake male children.

Individual level: caregiver risk factors.

*Single parent***.** The transition to parenthood brings a lot of change (Solmeyer & Feinberg, 2011) which can be stressful and challenging (Petch & Halford, 2008). Specifically, newborns require constant, 24-hour care, as they are completely dependent on their caregivers for shelter, food, clothing, and love (Petch & Halford, 2008; Vanzetti & Duck, 1996). This means that caregivers face challenges like fatigue and exhaustion (Newman, 2000), coping with incessant crying (Petch & Halford, 2008), a decline in disposable income (Thomas & Sawhill, 2005), and breastfeeding can place major physical demands on women's bodies (Cowan & Cowan, 2000; Fairbank et al., 2000).

The challenges of parenthood can be stressful, and may be even harder for single caregivers who are unable to share parenting responsibilities with a partner (Makoae et al., 2008). In support of this, research has found that single parents are more often stressed (Makoae et al., 2008; Ward, Makusha, & Bray, 2015), and that parenting difficulties can adversely impact on a single parent's psychological wellbeing (Robinson, 2009). For these reasons, the stressors of single-parenting may make it harder for caregivers to respond to children in a sensitive and warm manner.

In support of this, a study in the United States found that single mothers were three times more likely to report using harsh physical discipline in comparison to co-parenting mothers (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998). In terms of shaking, infants with recognised abusive head trauma were more likely to come from a home where both parents did not live together (Jenny et al., 1999). Similarly, caregivers in the Netherlands who admitted to shaking their infants were more likely to live alone (Reijneveld et al., 2004).

Caregiver age. The influence of maternal age on the occurrence of child maltreatment is inconclusive (Scannapieco & Connell-Carrick, 2016), although research has shown a relationship between young maternal age and child maltreatment (Black, Heyman, & Slep, 2001). One possible reason for the association is that younger caregivers are more likely to have made lifestyle choices (like engaging in casual sexual relationships) that lead to unplanned and/or unwanted pregnancies (Finer & Zolna, 2014; Scannapieco & Connell-Carrick, 2016). From this perspective, children may enter an unwelcoming world (Guterman, 2015), where the risk for maltreatment is high.

The relationship between unintended pregnancy and child maltreatment can, for example, be seen in a population-based study of children in the United Kingdom (Sidebotham, Heron, & The ALSPAC Study Team, 2003). In this study, "children registered with child protective services were nearly three times more likely than unregistered children to have resulted from an unintended pregnancy" (Guterman, 2015, p. 162). It, therefore, appears that young maternal age indirectly influences the risk for maltreatment through its relationship to unintended pregnancy, and the consequences thereof.

Another reason for the association between young maternal age and child maltreatment is the complexity of issues related to early childbearing (Miller, 1984; Scannapieco & Connell-Carrick, 2016). Specifically, research has shown a relationship between younger maternal age and several other factors, which together increase the likelihood of child maltreatment. For example, because younger mothers are less often married (Ward et al., 2015), they are less able to benefit from the immediate social and economic support that marriage provides (Scannapieco & Connell-Carrick, 2016). Other factors that have been linked to younger maternal age include, but are not limited to, low educational attainment (Centers for Disease Control and Prevention, 2014), less knowledge of child development, increased risk for depression (Savio Beers & Hollo, 2009), higher levels of stress and alcohol use, and unemployment (Miller-Lewis, Wade, & Lee, 2005). The interactive effects of younger maternal age with other risk factors, therefore, increase the risk for child maltreatment (Miller, 1984), and may extend to the violent shaking of young children.

Alcohol use. "Strong links have been found between alcohol use and child maltreatment" globally (World Health Organization, 2006, p. 1). One possible explanation for this link is that alcohol consumption alters physical and cognitive function (Giancola, 2000), leading to behavioural changes that increase the risk for child maltreatment. For example, alcohol use can reduce self-control, making individuals more likely to act violently (Giancola, 2000). Consequently, alcohol-related aggression (Giancola et al., 2009) has been shown to increase the risk for physical violence (Drapkin, McCrady, Swingle, & Epstein, 2005; Giancola et al., 2009), including towards children (Hafekost et al., 2017; Kaplan, Nayak, Greenfield, & Karriker-Jaffe, 2017; World Health Organization, 2006). From this perspective, alcohol-related aggression may increase the risk for shaking.

A second possible explanation for the relationship between alcohol use and child maltreatment is the capacity of intoxicated caregivers to parent effectively. Because infants are dependent on their caregivers, they require constant, 24-hour, care (Petch & Halford, 2008). When drinking is harmful or hazardous, children are reported to be at increased risk of neglect (Freisthler, Johnson-Motoyama, & Kepple, 2015; Leek, Seneque, & Ward, 2009)

because alcohol consumption can impair a caregiver's sense of responsibility and the ability to provide adequate care (Freisthler, Midanik, & Gruenewald, 2004; World Health Organization, 2006). Consequently, young children can become increasingly demanding as they are more easily distressed when caregiver's fail to meet their needs (Bernard-Bonnin, 2004; Tronick & Reck, 2009). In turn, caregivers may become increasingly frustrated by their infants' distress (Tronick & Reck, 2009), making them more likely than otherwise to act violently towards their children (World Health Organization, 2006).

Postnatal depression. Defined as a non-psychotic, post-birth depressive illness, postnatal depression affects 9 to 21% of all new mothers globally (Closa-Monasterolo et al., 2017; Kernot, Olds, Lewis, & Maher, 2015). Reported prevalence rates are even higher in lower-income countries (Hung et al., 2014; Madu & Roos, 2006; Stellenberg & Abrahams, 2015; Tomlinson & Lund, 2012; Tsai & Tomlinson, 2012). Postnatal depression is characterised by feelings of sadness or loss of interest, sleeping and appetite disturbances, lack of or excessive worry for the baby, anxiety, fatigue, physical agitation, and suicidal ideation (Beck & Indman, 2005; Closa-Monasterolo et al., 2017).

Postnatal depression is associated with compromised maternal psychosocial functioning; the latter affects early maternal-bonding processes (Closa-Monasterolo et al., 2017), and the mother-infant relationship (Chen, Tsai, & Lin, 2011; Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Tronick & Reck, 2009). Postnatal depression, therefore, reduces the functional capacity of mothers to parent effectively (Stellenberg & Abrahams, 2015), increasing the risk for child maltreatment.

In support of this argument, research has shown that mothers with postnatal depression were more likely to have an "intrusive" parenting-style (Cohn, Matias, Tronick, Connell, & Lyons-Ruth, 1986; Tronick, 1989), and they "engaged in rough handling, spoke in an angry tone of voice, and poked at their babies" (Tronick & Reck, 2009, p. 151). Other studies have shown that mothers with postnatal depression displayed more negative behaviours towards their babies (Hay, 1997; Murray & Cooper, 1997), and that the risk for mortality was higher among young children of mothers with postnatal depression (Chen et al., 2011). In terms of the risk for shaking, one study found that mothers of four-month-old infants in Japan with postnatal depression more often reported that they would violently shake their children (Fujiwara, Yamaoka, & Morisaki, 2016).

*History of childhood abuse***.** "The intergenerational transmission of child maltreatment occurs when a person who was maltreated as a child maltreats his or her own children" (Schelbe & Geiger, 2017, p. 1). The evidence for this cycle of abuse is unclear and often contradictory (Sidebotham, Heron, & The ALSPAC Study Team, 2006; Widom, Czaja, &

DuMont, 2015), although some research has provided support for the transmission (Berlin, Appleyard, & Dodge, 2011; Dixon, Browne, & Hamilton-Giachritsis, 2005).

Social learning theory (Bandura, 1977) is applied as an explanation for the intergenerational transmission of child maltreatment. According to this theory, individuals learn and adopt patterns of behaviour through imitating and modelling the behaviour of others (Sigelman & Rider, 2009). This means that maltreated children learn that violent behaviour is normal and/or appropriate (Woollett & Thomson, 2016). Similarly, violent behaviour is reinforced when the observed behaviour results in positive outcomes, like having control over others (Currie & Tekin, 2012). Social learning theory thus shows that "children learn maladaptive parenting practices from their own experiences of being parented" (Schelbe & Geiger, 2017, p. 16).

The cycle of abuse can also be explained by drawing on attachment theory (Bowlby, 1982). This theory posits that the attachment relationship that is formed between a child and caregiver early in life "serves as a template for future relationships and interactions in the social world" (Bowlby, 1982; Schelbe & Geiger, 2017, p. 18). Maltreated children tend to develop insecure-avoidant attachments patterns, and are more likely to have relational problems in future intimate relationships (Baer & Martinez, 2006; Schelbe & Geiger, 2017). They are also more likely to have "similar dysfunctional attachment styles with their children" (Schelbe & Geiger, 2017, p. 18), and this possibly increases the risk for maltreatment (Robboy & Anderson, 2011).

Knowledge of the dangers of shaking. One possible explanation why caregivers with lower knowledge of the dangers of shaking may be more likely to violently shake their babies is because they do not understand the potential consequences of their actions. Specifically, caregivers may not know that by violently shaking an infant, they may kill the child (Keenan et al., 2003; King et al., 2003) or that the child may be left with serious, long-term physical and/or psychosocial disabilities (Blumenthal, 2002; Talvik et al., 2006).

Research regarding knowledge of the dangers of shaking and the occurrence of violent shaking was not found in the literature, although several studies have assessed knowledge of the dangers of shaking and the incidence of recognised abusive head trauma in young children. The findings from these studies are mixed (Keenan et al., 2003), although some research has shown that higher levels of knowledge are linked to lower rates of abusive head trauma (Altman et al., 2011; Bechtel et al., 2011; Dias et al., 2005). Conversely, it can be postulated that having lower knowledge of the dangers of shaking increases the risk for violent shaking.

Because information on abusive head trauma in young children is extensively researched and widely disseminated in higher income countries (Barr et al., 2009b; Bechtel et al., 2011; Centers for Disease Control and Prevention, 2014; Keenan et al., 2003; Russell & Britner, 2006), the risk for shaking may also be higher in lower income countries where information on the subject is less often shared, and baseline levels of knowledge of shaking are likely to be lower.

Thoughts of violent shaking. In the literature, there is no mention of how having thoughts of violent shaking might lead to actual shaking. It is, however, postulated that caregivers might have thoughts of violently shaking their babies if they feel angry or provoked by their infant's crying. In turn, these thoughts may lead to actual shaking.

Responses to infant crying. Research has briefly suggested that caregivers' awareness of alternate responses to infant crying could reduce the risk for violent shaking (Russell, 2010). One response to infant crying is violent shaking, although other strategies may include, for example, momentarily passing a crying infant to someone else, or leaving an infant alone to self-soothe. Strategies like these may reduce the likelihood that caregivers will become increasingly frustrated with their infant's crying, and could be incorporated into shaking prevention initiatives. Conversely, caregivers who feel responsible for calming their infants may feel angry when their methods of soothing don't work, and these feelings can escalate to violent shaking.

Relationship level.

Lack of social support. Social support refers to the availability of tangible and emotional resources gained through having social bonds and supportive relationships (Taylor, Conger, Robins, & Widaman, 2015). Sources of social support vary, and can include for example, a spouse or partner, family, friends (Angley, Divney, Magriples, & Kershaw, 2015), and broader community systems like the church. A host of literature has shown that social support reduces the risk for child maltreatment (Ceballo & McLoyd, 2002; Gay, 2005; Stith et al., 2009), and conversely, a lack thereof increases this risk.

One hypothesis is that caregiver social support has a "direct effect on parenting behaviours and child well-being" (McConnell, Breitkreuz, & Savage, 2010, p. 680). Specifically, a supportive spouse or partner may, for example, influence parenting by increasing a caregiver's immediate access to emotional and/or economic support (Scannapieco & Connell-Carrick, 2016). Other functions of social support are that it increases access to information, including "real-life examples of coping strategies and parenting techniques" (Gay, 2005, p. 387; Thompson, 1994). It also increases parenting competence by providing emotional sustenance (Angley et al., 2015). In line with this

reasoning, lower levels of social support reduce caregivers' access to material and psychosocial resources that may otherwise protect against child maltreatment.

In support of this, studies with African American single mothers have found that mothers with more social support "engage in higher levels of parental warmth and monitoring" (Ceballo & McLoyd, 2002; Miller, McKay, & Baptiste, 2007; Taylor et al., 2015, p. 194). Conversely, in a review of the risk factors for child physical abuse, perpetrators reported having fewer emotional resources from their social networks compared to non-perpetrators (Black et al., 2001). Other research also provides support for the association between lower levels of social support and physical child maltreatment (Corse, Schmid, & Trickett, 1990; Kitamura, Takauma, Tada, Yoshida, & Nakano, 2004).

A second possible explanation for the link between social support and child maltreatment can be understood from the stress-buffering hypothesis. According to this hypothesis, social support may eliminate or reduce the negative impact of stressful events (Cohen & Hoberman, 1983). In terms of caregiver social support, higher levels of social support may, therefore, positively influence "caregiving behaviour by reducing the effects of parenting stress"; the latter which increases the risk for punitive parenting (Ceballo & McLoyd, 2002; Pinderhughes, Dodge, Bates, Pettit, & Zelli, 2000) and child maltreatment (Black et al., 2001; Maguire-Jack & Negash, 2014; McConnell et al., 2010, p. 679). For these reasons, the risk for violent shaking might also be greater among caregiver's with lower levels of social support.

Intimate partner violence. Defined as any form of violence that occurs in a relationship between two romantic partners (Holt, Buckley, & Whelan, 2008), intimate partner violence is one of the most common forms of violence against women worldwide (Devries et al., 2010). At least "one third of women report a lifetime prevalence of intimate partner violence" (Bair-Merritt, 2010; Easterbrooks, Katz, Kotake, Stelmach, & Chaudhuri, 2015, p. 2), and South Africa has the highest reported global intimate femicide rate (Abrahams et al., 2009).

Regarding the risk for child maltreatment, there is a wealth of empirical evidence that has shown that abused caregivers are more likely to hurt their children (Fieggen et al., 2004; Jouriles, McDonald, Slep, Heyman, & Garrido, 2008; Stith et al., 2009; Madu & Jegede, 2002). Similarly, the risk for mortality is higher for children younger than five years who live in homes where intimate partner violence is common (Åsling-Monemi, Peña, Ellsberg, & Persson, 2003; World Health Organization, 2012).

The concept of displaced aggression is applied as one possible explanation for the association between intimate partner violence and child maltreatment. Displaced aggression can be defined as when an individual "cannot aggress towards a source of incitement or

provocation", and instead takes his or her anger out on someone else (Woollett & Thomson, 2016, p. 1069). For maltreated caregivers, they may, therefore, take their anger out on their infants who are easy, defenceless targets. Similar to this, research has also shown that children may be abused by resentful intimate partners (Makoae et al., 2008).

The many adverse mental health consequences of intimate partner violence is a second possible explanation for the association with child maltreatment. Specifically, maltreated women are more likely to suffer from anxiety, depression, low self-esteem, substance use disorders, and suicidality (Afifi et al., 2009; Joyner & Mash, 2012; Martin & Artz, 2006). These issues can foster psychological unavailability (Easterbrooks et al., 2015) which in turn contribute to negative parenting practices (Stellenberg & Abrahams, 2015; World Health Organization, 2006) like insensitive parenting, and harsh or inconsistent discipline (Krishnakmuar & Buehler, 2000). Consequently, the risk for shaking might be higher among maltreated caregivers who displace their anger onto their children, or who suffer mental health complications related to intimate partner violence.

Community level.

Community violence. There are many different ways that community violence can be defined (Coulton, Crampton, Irwin, Spilsbury, & Korbin, 2007; DeCou & Lynch, 2015). One definition is the "frequent and continual exposure to the use of guns, knives, drugs, and random violence" (Osofsky, 1995, p. 782) within a community setting. Exposure to violence can include "knowing victims of community violence, witnessing community violence, and being victimized" (Overstreet, 2000, p. 8). Community violence tends to be concentrated in areas of high disadvantage (Ceballo & McLoyd, 2002; Shields, Nadasen, & Pierce, 2009), and is linked to a higher overall risk for child maltreatment (Coulton et al., 2007).

Community violence can influence parenting behaviour through its effects on caregivers' social support systems (Ceballo & McLoyd, 2002). Social support reduces the risk for child maltreatment (Gay, 2005; Stith et al., 2009), and research has shown that the "positive influences of social support on parenting behaviour can be weakened in poorer, high-crime environments" (Ceballo & McLoyd, 2002, p. 1310). This is partly because the support provided by people in these communities may be attenuated because these same people can be highly stressed in response to violence in their environment (Ceballo & McLoyd, 2002; Coulton & Pandey, 1992). Community violence, therefore, increases the risk for maltreatment (and shaking) by impacting on caregivers' quality of social support.

Community violence can also be a source of psychological distress (Shields et al., 2009), and can lead to mental health consequences (like postnatal depression) that increase the risk for child maltreatment (Lewin, Horn, Valentine, Sanders-Phillips, & Joseph, 2011).

Societal level.

Poverty. A host of research has shown an association between poverty and child maltreatment worldwide (Black et al., 2001; Bywaters et al., 2016; Department of Social Development et al., 2012; Farrell et al., 2017; Stith et al., 2009), although the link is not a simple one. Poverty can impact parenting behaviour both directly and indirectly (Bywaters et al., 2016). One route for this is that poverty directly increases the risk for material hardship, lack of money (Bywaters et al., 2016), and the likelihood of living in overcrowded households (Hall, 2018). These hardships can, in turn, lead to parental stress (Bywaters et al., 2016; Solari & Mare, 2012), making caregivers more likely to be emotionally distant, harsh, and parent inconsistently (Kotchick & Forehand, 2002; Ward et al., 2015). Additionally, "risk factors related to poverty, such as income inequality, low economic development, and gender inequality are strongly associated with violence" (Department of Social Development et al., 2012, p. 8), and may be another route to child maltreatment.

In support of these arguments, the risk for fatal child abuse in children under age four in the United States was more than three times greater in areas of high poverty concentration (Farrell et al., 2017). Other studies have shown similar findings (Eckenrode, Smith, McCarthy, & Dineen, 2014; Slack, Holl, McDaniel, Yoo, & Bolger, 2004), including that household poverty was linked to a higher risk for physical child abuse in South Africa (Meinck, Cluver, & Boyes, 2015). Because poverty tends to be concentrated in areas of higher disadvantage (Department of Social Development et al., 2012), it can be postulated that the risk for violent shaking may also be higher in poor communities.

Unemployment. Not having a source of income invariably increases the risk for economic hardship and/or poverty (Department of Social Development et al., 2012), and therefore, the risk for child maltreatment (Raissian, 2015). Similarly, unemployment is related to other factors that indirectly increase the risk child maltreatment. For example, unemployment can be a trigger of stress (Slack et al., 2004), and caregivers may consume more alcohol as a means to cope with the stress of being unemployed (Boardman, Finch, Ellison, Williams, & Jackson, 2001; Eliason & Storrie, 2009). Unemployment can also increase the risk for depression (Stankunas, Kalediene, Starkuviene, & Kapustinskiene, 2006), and caregivers may have feelings of shame and/or failure from being unable to provide an income. Consequently, the risk factors that are related to unemployment may increase the likelihood of harsh, punitive parenting (Ceballo & McLoyd, 2002; Closa-Monasterolo et al., 2017; Drapkin et al., 2005), as well as the risk for violent shaking.

In support of the latter, unemployment was identified as a risk factor among parents in the Netherlands who reported to violently shaking their infants (Reijneveld et al., 2004).

Summary and Conclusion

The purpose of this introductory chapter was to provide an extensive overview of the literature on abusive head trauma, highlighting that much of what is known about this phenomenon is based on international data from high-income countries (Cooper et al., 2016). The vigorous, manual shaking of young children is a recognised pathway to abusive head trauma (Arbogast et al., 2005), and often results in death (Bechtel et al., 2011) or life-long morbidity (Blumenthal, 2002; King et al., 2003). The consequence are, therefore, devastating.

To conceptualise how a culmination of risk factors might increase the risk for shaking, Bronfenbrenner's ecological systems framework was applied as one possible theory. Inconsolable crying was consistently identified as the primary risk factor for shaking (Centers for Disease Control and Prevention, 2014; Mann et al., 2015), and because infants cry to communicate (Kim, 2011), they are for this reason at highest risk of being shaken. A host of other risk factors were also identified, including for example, that physically abusive caregivers are more likely to be young (Black et al., 2001), single (Straus et al., 1998), poor (Bywaters et al., 2016), use and/or abuse alcohol (World Health Organization, 2006), lack social support (Ceballo & McLoyd, 2002), and be abused by their partner (Stith et al., 2009).

The current conundrum, therefore, is that South Africa has amongst the highest reported rates of child homicide (Abrahams et al., 2016) and/or child mortality (The United Nations Inter-agency Group for Child Mortality Estimation, 2018) worldwide, yet recorded instances of violent shaking appear to be an extremely rare occurrence (Chibambo, 2016; Mattes, 2016), contradicting international comparisons.

Significance

The present study extends existing research by being the first of its kind to investigate whether mothers and other primary female caregivers in South Africa – hereinafter referred to as caregivers – violently shake their infants under one-year-old, as well as, if so, to identify associated risk factors. Female caregivers were the focus of this study because research has shown that women carry out the majority of caregiving in South Africa (Hall & Sambu, 2018a), and for this reason, they are also more likely to be reached by interventions in the future. Essentially, the premise underlying this research is that the findings may have critical programmatic implications that could help prevent the violent shaking of young children in South Africa, if this form of maltreatment is indeed recognised in this study.

Research Objectives

The objectives of this study were to:

1a). Determine the extent to which caregivers violently shake their infants;

1b). Determine the extent to which caregivers report thoughts of violent shaking;

2). Ascertain the triggers of shaking, if caregivers have shaken their infants;

3). Determine if the following risk factors predicted shaking and thoughts of shaking;

- Inconsolable infant crying
- Responses to infant crying
- Infant age
- Infant gender
- Relationship status
- Caregiver age
- Alcohol use
- Postnatal depression
- Caregiver history of childhood abuse
- Knowledge of the dangers of shaking
- Social support
- Intimate partner violence
- Community violence
- Poverty
- Employment status
- Thoughts of shaking

4). Determine if the above risk factors predicted knowledge of the dangers of shaking;

5). Explore the indigenous methods that caregivers use to console crying babies.

This dissertation is divided into four chapters. Following from this introductory chapter, the methods for this study are presented in Chapter Two. The results are then presented in Chapter Three, and Chapter Four concludes with a discussion of the study findings.

Chapter 2: Methods

Design and Setting

The study used a cross-sectional design and data was collected from May to June 2016 from three public clinics in the greater Cape Town area: the Klip Road, Seawinds, and Valhalla Park Clinics. These clinics were chosen partly because they each have a 'well-baby facility' that provides monitoring services for infants (e.g., weight monitoring and immunization), making it easier to locate participants with young children. In addition, these clinics are in areas that are very deprived and where caregivers would be under high stress.

One of the consequences of the Apartheid regime is that South Africa remains one of the most unequal societies in the world (Makoae, Roberts, & Ward, 2012). During the regime, people were segregated by race and this dictated their class, access to opportunities, and the organisation of neighbourhoods with consequences that persist today. For example, in less economically-developed urban areas such as Cape Town's informal housing settlements, the areas are densely populated and concentrated with poverty, unemployment, and poor education and health outcomes; which together contribute to the social dynamics that fuel violence against children (Centre for the Study of Violence and Reconciliation, 2007; Mathews & Benvenuti, 2014; Seedat et al., 2009). The present study was therefore located in areas (i.e., Grassy Park, Seawinds, and Valhalla Park) where caregivers were likely to be experiencing high levels of stress and relatively little support from services. I chose to work in these locations as women caring for children would be most likely to be in need of support to prevent the violent shaking of infants.

Participants

Sampling procedure. Mothers and other primary female caregivers (e.g., family members, nannies) with male or female infants younger than one year old were recruited using a random, systematic sampling approach. Female caregivers were the focus of this study, primarily because they are more often the carers for young children in South Africa (Hall & Sambu, 2018a). Additionally, a review of homicide in children under age five in South Africa indicated that mothers (71%, n = 322) were most often the perpetrators of fatal child abuse (Abrahams et al., 2016).

Children younger than one year old were also the focus because they tend to cry more, and inconsolable crying is recognised as the primary trigger that leads to shaking (Centers for Disease Control and Prevention, 2014). Similarly, because infants are not as anatomically developed, it is easier to shake an infant compared to an older, heavier child, and for the same reason, infants are at heightened risk of injury from shaking (Blumenthal, 2002).

Inclusion criteria. Basic verbal comprehension of the Participant Screening Checklist (see Appendix A) in either Afrikaans, English or isiXhosa was required for participation, and ensured that there were no language barriers between the researcher and the participant. Afrikaans and isiXhosa are two indigenous languages spoken in the Western Cape Province by Coloured (mixed ethnic origin) and Black Africans respectively. These ethnic groups are a construction of Apartheid legislation and continue to experience health disparities and other stresses in South Africa. I use these ethnic categories here not as an endorsement of them, but rather to identify populations that continue to experience significant marginalisation in a number of areas (Coovadia, Jewkes, Barron, Sanders, & McIntyre, 2009).

Exclusion criteria. Mothers and other primary female caregivers younger than 18 years old were excluded because they do not have capacity to give consent for participation under South African law. Similarly, participants could only be interviewed once, and if an individual participated a second time (which did occasionally happen, as judged by duplicate names and signatures on consent forms), the participants' second interview was excluded.

To date, most international studies have shown that males are the most common perpetrators of shaking (King et al., 2003; Lazoritz & Palusci, 2001). In this study, fathers and other primary male caregivers were not included because they were very much in the minority at the clinics, suggesting a somewhat distanced involvement of fathers in caring of young children in historically poor areas in South Africa. To support this, the living arrangements for children were such that in 2017, 41% of all children (8.1 million) under 18 years old lived with their mothers, and only 3% (n = 588,000) lived in a home where their fathers were present and their mothers were absent (Hall & Sambu, 2018a). From this perspective, it seems that women carry out the majority of caregiving, and for this reason, are both more likely to be the caregiver who shakes, and to be reached by intervention programs in the future.

Ethical Considerations

The Research Ethics Committees of the City of Cape Town, City Health (Reference Number: 10561, see Appendix B) and the Department of Psychology at the University of Cape Town (Reference Number: PSY2016-002, see Appendix C) both approved the study.

Before researchers administered the study questionnaire, participants were asked to provide written informed consent (see Appendix D), and a printed copy of the consent form was given to the participant to take home. In this process, the researcher discussed the consent form with the participants and gave them the chance to ask questions. The principles of ethical research were maintained in the following ways.

First, respondents were informed, in clear and simple language, that participation in the study was entirely voluntary, and similarly, that they could take a break or withdraw at any time, free of consequence. Similarly, clinic staff were also notified that there could be no consequences for the participants should the staff become aware of a woman's participation or non-participation.

Second, personal identity and information were protected because participants were given a respondent number, and questionnaire responses and consent forms (with names) were not linked to the numbered questionnaires in any way. The data thus remained anonymous. The hard copy questionnaires were kept in a locked filing cabinet and the online data was stored on a password-protected computer that only the primary researcher could access.

Third, participants were not obliged to answer any questions, and could cease participating at any point. If a question of a sensitive nature (e.g., intimate partner violence) elicited unwanted feelings, the participant was offered the opportunity to be referred for free counselling. Respondents were also informed that if they or their infants were identified to be at risk of physical or psychological harm, the researcher was required by law to inform a healthcare practitioner. This was the only instance in which confidentiality would be broken.

Participants were provided with refreshments during the interview – they received a snack and cool drink, and to thank them, each participant was given a tub of Bennett's Baby Bum Crème (cream to prevent nappy rash). At the end of each interview, the researcher debriefed the participant, and provided a printed copy of the debriefing form that contained the study contact details in case participants had follow-up questions (see Appendix E). As part of this form, participants were provided with details of accessible services, in case questions in the interview raised issues that left the women wanting services. These services included, for example, the Post Natal Depression Support Association of South Africa (PNDSA), the Family and Marriage Society of South Africa (FAMSA), and The South African National Council on Alcoholism and Drug Dependence (SANCA). An attached information brochure (see Appendix F) about the dangers of shaking was also provided to and explained to participants after the interview. The final dissertation will be submitted to the City of Cape Town, Department of Health, and the Bennett's Baby Care Company, in accord with the agreements made (see Acknowledgements).

Measures

The study questionnaire had 12 self-report scales that were combined into a 24-page interviewer-administered survey (see Appendix G). Most measures were adapted to a simple 3-point Likert-type scale because this type of scale is easier to understand compared to scales

with more choice options that might not be as appropriate for individuals from low literacy populations (Ward et al., 2015).

Once the English questionnaire was finalised, it was translated into isiXhosa and Afrikaans versions by translators who spoke the respective languages as their mother tongue. The methods of translation differed for the two languages. Because isiXhosa is a tonal language and the same grammatical structures can have different meanings according to tone, it can be harder to translate (Calteaux, 1996). Historically, isiXhosa is also not a written formal language, and although it is increasingly being written now, the language has not been standardised and also differs regionally (Calteaux, 1996). A consensus, forward translation approach was therefore used, and two bilingual assistants (isiXhosa: English) worked together to translate the English questionnaire into the isiXhosa version. A benefit of this method was that any discrepancies in interpretation could be discussed and agreed upon (Smit, van den Berg, Bekker, Seedat, & Stein, 2006). To translate the English questionnaire into the Afrikaans version, a forward translation approach was used, i.e., an experienced Grade 7 Afrikaans teacher translated the questionnaire.

Demographic questionnaire. Participants were asked to indicate their age, ethnicity, home language, education, employment, grant, income, and relationship status. Participants also provided their infant's age and gender. Most of these demographic characteristics are predictors of child maltreatment, with the exception of ethnicity and home language that were used to assess whether the sample included groups that are typically marginalised in Cape Town (Makoae et al., 2012; Mersky, Berger, Reynolds, & Gromoske, 2009).

Regarding the Child Support Grant, since April 2017 the primary caregiver of a child younger than 18 years has been entitled to receive R380 per month on condition that the caregiver earned less than R3,800 ($320; if single) or R7,200 ($641; combined income if married) per month (Hall & Sambu, 2018b). In comparing the Child Support Grant to the three national poverty lines proposed by Statistics South Africa, the monetary value of the Child Support Grant is lower than even the food poverty line (R415 per person per month in 2015) – people living below this line "are unable to afford even a minimum balanced diet" (Hall & Budlender, 2016, p. 34). Grant status is, therefore, an additional indicator of income and reflects an aspect of poverty.

Household information. The measure consisted of five items that were divided between two sections. The first section asked two questions that assessed household size and the number of children (i.e., younger than 18 years old) in each house. Household size has been used to indicate overcrowding – following other South African literature, this was

defined as: “a ratio of more than two people per room (excluding bathrooms but including the kitchen and living room)”; Hall, 2018, p. 159).

Overcrowding is a problem because children are more likely to be exposed to the risk factors for child maltreatment, including for example: poverty, intimate partner violence, and parental substance use (Lefebvre, Fallon, Van Wert, & Filippelli, 2017). These and other risk factors place children at heightened risk of abuse (and potential shaking), and ultimately compromise children’s rights to health and safety. Studies have also shown that overcrowding is linked to housing type, and children living in informal housing (e.g., shacks within informal housing settlements) are more likely to live in overcrowded conditions (Hall, 2018). Estimates show that the average household size for mixed generation households (i.e., homes with children) was 4.7 persons per household in 2017 in South Africa, and 18% (3.6 million) of the child population lived in overcrowded conditions (Hall, 2018). Of concern, 23% (*n* = 828,000) of all children living in overcrowded households were children younger than two years old (Hall, 2016; Statistics South Africa, 2015). These findings suggest that the risk for shaking may be higher for young children because they often live in environments which expose them to more risk factors.

The second section, the Household Hunger Scale, is an adapted measure from the Household Food Insecurity and Access Scale and was used to assess poverty, as measured through severity of household hunger (Deitchler, Ballard, Swindale, & Coates, 2010; Swindale & Bilinsky, 2006). Poverty is a proposed risk factor for shaking because, broadly speaking, the stress of poverty increases the risk for abuse (Bower, 2003). It follows that the risk for shaking may, therefore, be higher in economically disadvantaged areas (like in this study) in comparison to more affluent areas.

The Household Hunger Scale used three items to assess household hunger in the preceding four weeks or thirty days. Each item was first assessed as a ‘yes’ or ‘no’ outcome, and when a 'yes’ outcome was given, three response options were given for that question and scored as follows: 1 (*rarely: 1 – 2 times*), 1 (*sometimes: 3 – 10 times*), and 2 *(often: more than 10 times).* When a participant responded ‘no’ to an item, a score of 0 was given. A total continuous scale score classified the severity of household hunger into one of three categorical outcomes: 0 – 1 (*little to no household hunger*), 2 – 3 (*moderate household hunger*), and 4 – 6 (*severe household hunger*).

In the initial validation study, the Household Hunger Scale demonstrated cross-cultural validity across seven diverse contexts, and a strong relationship was found between median monthly household income and associated household hunger in the South African sample (Deitchler et al., 2010). Essentially, the severity of household hunger increased as household

income decreased, indicating a relationship between income and poverty (Deitchler et al., 2010). In this study, the association between income and poverty was not directly examined – it was not a focus of the research – but descriptive statistics for both variables are provided. In other evidence, household hunger was one of two significant predictors of life satisfaction in a sample of isiXhosa women in the rural Eastern Cape, Southern Africa, (Dodd, 2016). Taken together, the Household Hunger Scale seems to be a reliable indicator of poverty, and can reasonably be expected to extend to female caregivers in South Africa.

Items assessing infant crying. Both qualitative and quantitative assessments of caregiver responses to infant crying were designed for this study.

Table 1

Qualitative Assessment of Infant Crying

Question
1. When your baby cries, what do you do to make him or her stop crying?
2. Does your baby ever cry on and on without stopping?
3. (If the participant answered 'No' in question 2): What do you do that prevents your baby from crying on and on?
4. (If the participant answered 'Yes' in question 2): When your baby won't stop crying, what do you do to make him or her stop crying?
5. When your baby won't stop crying (or cries), does this ever make you feel irritable, angry, upset, or depressed?
6. The last time you felt frustrated or upset when your baby cried on and on without stopping (or cries), did you do anything different to make him or her stop crying?

In the qualitative component (see Table 1), the methods that women used to calm their crying infants were examined. Knowing that inconsolable crying is widely recognised as the primary trigger for shaking, it was important to ascertain whether certain methods of responding to infant crying were more or less likely to evoke shaking.

The quantitative component designed for this study also assessed the caregivers' responses to infant crying. A standardised scale of this sort could not be identified in the literature. Therefore, the Responses to Infant Crying Scale (see Appendix G, Section C: Part 2) was developed using a combination of 15 items from three separate scales designed by Barr et al. (2009a) – the Responses to General Crying Scale, the Responses to Inconsolable Crying Scale, and the Self-talk Responses to Inconsolable Crying Scale.

Scale items were simplified from the original 5-point Likert-type scale to a 3-point scale, making the scoring system easier for participants to understand (Ward et al., 2015). Items were scored as: 1 (*a lot of the time*), 2 (*sometimes*), and 3 (*never*), and item 4 was reverse-scored. Participants could score a minimum total score of 0 and a maximum of 45; higher scores meant that participants were less likely to respond well to infant crying.

Measure to assess shaking. The Shaken Baby Scale (see Appendix G, Section D) was designed for this study and consisted of six items. Question 1 examined if participants had previously shaken their baby in response to infant crying, and items 2 to 6 formed the Thoughts of Shaking Subscale (this assessed thoughts of shaking in response to infant crying). For each of the six items, a list of both positive and negative caregiving responses were given so as to distract the participant from the intended behaviour of study, viz., shaking. Thus, question 1 (for example) asked: "When your baby cries, how often have you rocked your baby in your arms? … smacked your baby? … sang to your baby?… shaken your baby?". For each caregiving response, the researcher would first demonstrate the behaviour using a lifelike infant doll so that participants clearly understood the intended action. It is possible that had this demonstration had not been done, some women may have misinterpreted the action of "shaking" as "gently rocking" a child.

Each item was scored on a 3-point Likert-type scale and response options ranged between 0 (*never*), 1 (*sometimes*), and 2 (*a lot of the time*). Because question 1 (which examined if infants had been shaken) was separate from the Thoughts of Shaking Subscale (questions 2 to 6), participants could score a minimum total score of 0 and a maximum of 2 for question 1. For this study, however, the outcome from question 1 was transformed into a dichotomous 0 (*no)* or 1 (*yes)* score. This means that if a participant initially responded as 'sometimes' or 'a lot of the time' as per the original scale score, these categories were subsequently scored as 1 (*yes*). The scores in question 1 were dichotomised so that the risk factors for shaking could be assessed using a hierarchical logistic regression analysis.

For the Thoughts of Shaking Subscale, participants could score a minimum of 0 and a maximum of 10; the total scale score was determined by summing together the "shaken baby" component from the five items (questions 2 to 6). Higher scores meant that participants were more likely to have had thoughts of shaking their children.

Question 1 was earmarked as important because if an individual reported shaking a baby, the following question was asked at the end of the interview: "Previously, you mentioned that you have shaken your baby when his or her crying frustrated or upset you. Can you please show me what happened (using the lifelike infant doll) and tell me a little more about this?" (see Appendix G, Section M). This open-ended question meant that the

participant's subjective experience of shaking could be documented. This also confirmed whether the participant had actually shaken the infant in a violent manner or not. This question was only asked at the end of the questionnaire so as to avoid biasing participant responses to shaking items that were asked in earlier scales.

Awareness of safely responding to infants. The Shaken Baby Syndrome Awareness Assessment – Short Version **(**Appendix G, Section E) was adapted from the Shaken Baby Syndrome Awareness Assessment and examined an individual's awareness of how to respond to a crying infant safely (Russell, 2010; Russell & Britner, 2006). Caregiving responses were examined according to three scales: discipline techniques, soothing techniques, and the potential for injury.

The first item in the measure was independent from the three scales, and assessed the duration of time that a participant would leave a crying infant alone for, i.e., "It is okay for a caregiver to leave a crying baby alone for…", and five response options were given (the participant could only choose one option): (*never*), (*up to 5 minutes*), (*up to 15 minutes*), (*up to 30 minutes*), or (*more than 30 minutes*). By leaving an infant to self-soothe for a few minutes (although still checking up on the baby at regular intervals), it can be beneficial for parents who become easily frustrated with inconsolable crying (Kim, 2011).

Table 2

The Shaken Baby Syndrome Awareness Assessment - Short Version

Response	Scale		
	Reasonable discipline	Useful for soothing	Could cause injury
1. Rocking the baby in your arms	-	-	-
2. Shouting or screaming at the baby	-	-	-
3. Distracting the baby with a toy or food	-	-	-
4. Walking while holding the baby	-	-	-
5. Withholding or taking away food	-	-	-
6. Shaking the baby	-	-	-
7. Talking to the baby	-	-	-
8. Spanking the baby	-	-	-
9. Holding the baby	-	-	-
10. Hitting, slapping, or striking the baby	-	-	-
11. Feeding the baby	-	-	-

The three scales were assessed using a list of 11 caregiving behaviours (see Table 2). The first item in the list was changed from "Rocking the baby in a rocking chair" to "Rocking the baby in your arms" because most women in informal housing settlements do not have rocking chairs. Typically, the scale has a list of 12 caregiving responses, but one item was removed (i.e., scolding the baby verbally) because it was similar to item 2 in the scale, viz., shouting or screaming at the baby.

Scale items were adapted from the original 6-point Likert-type scale to a 3-point scale, and thus scored as: 1 (*disagree*), 2 (*not sure*), and 3 (*agree*). Items 1, 3, 4, 7, 9, and 11 were reverse scored for the "discipline techniques" and "soothing techniques" scales. A participant could score a minimum of 10 and a maximum of 30 for each scale. Higher scores indicated lower awareness in terms of how to respond safely to a child.

In the initial validation study in England, the Shaken Baby Syndrome Awareness Assessment – Short Version revealed moderate internal consistency for all three scales (α = .70 to .79) in a sample of primarily female university students (63%, n = 270; Russell, 2010). Other studies have shown that although there have been significant increases in the awareness that shaking can be dangerous, international rates of traumatic head injuries have remained stable, including those that lead to shaken baby syndrome (Dias et al., 2005; Russell, 2010). It has been proposed that knowing how to respond safely to an infant during times of heightened frustration may be more protective than simply knowing about the dangers of shaking, hence the inclusion of these items in this study.

Intimate partner violence. The Revised Conflict Tactics Scales - Short Form is adapted from the Revised Conflict Tactics Scale and assesses mutuality of violence (i.e., being a victim and/or perpetrator of violence) in a relationship during times of conflict (Straus & Douglas, 2004; Straus, Hamby, Boney-McCoy, & Sugarman, 1996). Given the time constraints of this study, and because South Africa has the highest reported intimate femicide rate in the world (Gordon, 2016), only the participant's experience as a victim of violence was examined. The decision to examine the participants' experiences of victimisation is supported by one study which found that women were more likely to physically maltreat (and hence, potentially shake) their children when they themselves were abused in an intimate relationship (Peled, Davidson-Arad, & Perel, 2010). One explanation for this finding may be that women who were abused experienced more stress, making them more likely to use harsh, inconsistent parenting (Levendosky & Graham-Bermann, 1998; Peled, 2011; Peled et al., 2010).

In this study, the Revised Conflict Tactics Scales Short Form consisted of 10 items that assessed victimisation according to five subscales. These were: physical assault,

psychological aggression, negotiation, injury from assault, and sexual coercion (Straus & Douglas, 2004). Each subscale was made up of two items, classifying violence according to one of two severity levels: less severe violence (e.g., push) and severe violence (e.g., punch; Straus & Douglas, 2004). The reason for considering the different levels of violence is because severity of abuse may be indicative of amount of abuse. For example, if a woman suffers severe abuse (like being punched), it can reasonably be expected that she will also experience less severe forms of violence (like being pushed).

The scale items were scored on a 3-point Likert type scale: 0 (*never*), 1 (*sometimes*), and 2 (*a lot of the time*), and participants could score a minimum total score of 0 and a maximum of 30. Higher scores indicated that women experienced more violence.

The Revised Conflict Tactics Scales Short Form was designed using the sample of university students that completed the Revised Conflict Tactics Scale, meaning that the psychometric properties of the short form are an approximation from the original validation study (Straus & Douglas, 2004). In comparing the two scales in the original validation study, the Revised Conflict Tactics Scales Short Form demonstrated good concurrent validity for all five subscales measuring victimisation of violence (range of α: .67 to .94; Sachetti & Lefler, 2017; Straus & Douglas, 2004). The short form also produced similar results to the original scale when both were compared to other risk factors of intimate partner violence: this means that the short form has good construct validity (Straus & Douglas, 2004). Regarding evidence that is more culturally relevant to this study, the internal consistency of the short form was high (α = .83) in a sample of low-income, African American women in the United States (Fincher et al., 2015). From this perspective, the scale seemed to be applicable for use with women of mixed ethnic groups from low-income areas in South Africa. To support this, the Revised Conflict Tactics Scale was successfully used (α = .85) in a sample of pregnant women (who spoke either Afrikaans, English, or isiXhosa) in a low resource setting in the country (Field, Onah, van Heyningen, & Honikman, 2018).

Alcohol use. The Alcohol Use Disorders Identification Test was used to screen for excessive drinking and identified participants with concerning patterns of recent alcohol consumption, these were: hazardous drinking, harmful drinking, and alcohol dependence (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). Excessive drinking is problematic because it places children at risk of danger – for example, caregivers who drink excessively may be less able to inhibit harsh behaviour (like shaking), or they may be more easily angered or provoked by a behaviour like inconsolable crying. For these reasons, it was important to assess whether women in this study drank excessively, and whether this behaviour was related to the potential for shaking.

The Alcohol Use Disorders Identification Test consisted of 10 items that were scored on a 5-point Likert-type scale, and item responses differed qualitatively between questions. The most common response option was: 0 (*never*), 1 (*less than monthly*), 2 (*monthly*), 3 (*weekly*), or 4 (*daily or almost daily*). Although most other scales in this study have been adapted to simpler Likert-type scales, the scoring system in this scale was not changed because the measure has been used successfully in South Africa with populations similar to the present study sample (Aalto, Alho, Halme, & Seppa, 2009; Myer et al., 2008; Peltzer, Seoka, Babor, & Obot, 2006). Participants could score a minimum total score of 0 and a maximum of 40, and cut-off scores determined three domains of excessive drinking: 8 – 15 (*hazardous drinking*), 16 – 19 (*harmful drinking*), and greater than or equal to 20 (*possible dependence*; Babor et al., 2001).

In terms of adjustments, two minor qualitative changes were made to the scale. First, a follow-up question was added after question 2 (the latter asked, “How many drinks containing alcohol do you have on a typical day when you are drinking?”). The follow-up question was: “What drinks are these? E.g., Quart, wine, whiskey, brandy etc.?”. The purpose of this question was to determine if the quantity of alcohol consumed was equal to one standard drink, i.e., a 340ml beer, 125ml red wine, or 60ml sherry (Tampah-Naah & Amoah, 2015). This information was important to ascertain and should be considered in the further development of the scale because, for example, in informal housing settlements in South Africa, quart beers (i.e., a 750ml bottle of beer) are popular and often considered as "one beer". Similarly, the size of “one glass” of wine or spirits is relative to an individual’s drinking norms, and it is, therefore, beneficial to clarify with participants what they consider as “one drink”. It may also be that participants are consuming more alcohol than what they report, particularly if the criteria of “one drink” is accepted at face value. Unfortunately, most of the data in response to this added question was missing and could not be used. It is suggested that future research consider adding this question so as to clarify the amount of alcohol that participants actually consume. Regarding the second adjustment to the scale, question 3 was changed from "How often do you have six or more drinks on one occasion?" to “… three or more drinks on one occasion?”. In South Africa, women are advised to have less than three ‘standard drinks’ a day, so anything above this was considered as excessive (Tampah-Naah & Amoah, 2015); this criterion was successfully used to identify risky drinkers in South African clinics (Mertens, Ward, Bresick, Broder, & Weisner, 2014).

The Alcohol Use Disorders Identification Test has been internationally validated and used for over two decades; it is an accurate measure of risk of alcohol abuse across age, gender, and culture (Babor et al., 2001). In the initial validation study across different

contexts, the scale revealed sensitivities in the mid .90's, specificities in the .80's, and good test-retest reliability (*r* = .86, Allen, Litten, Fertig, & Babor, 1997; Babor et al., 2001). Subsequent studies corroborate the reliability of the scale as they too obtained high sensitivities (range: .85 to .96) and specificities (range: .80 to .96) across different populations (Allen et al., 1997; Cherpitel, 1995; Isaacson, Butler, Zacharek, & Tzelepis, 1994). In terms of its applicability to the South African context (and more relevant to this study), the Alcohol Use Disorders Identification Test has been validated with a sample of adult HIV-infected clinic attendees in Tshwane (Kader, Seedat, Koch, & Parry, 2012). Here, the scale proved to be reliable, attaining high sensitivities (100% and 83.3%) and adequate specificities (53.6% and 61.1%) in comparison to two biological markers of alcohol use (Kader et al., 2012). Additionally, the scale was used in a South African antenatal population with women of varying ethnicities, indicating that its use with female caregivers as per this sample was appropriate (Vythilingum, Roos, Faure, Geerts, & Stein, 2012).

Postnatal depression. The Edinburgh Postnatal Depression Scale assessed postnatal depression by examining the participant's experience of common postnatal depression symptoms in the previous seven days (Cox, Holden, & Sagovsky, 1987). Postnatal depression can have adverse implications for both maternal and child health, and is a particular concern because it is often under-diagnosed during pregnancy and the postpartum period (Hung et al., 2014). If left untreated, postpartum depression can lead to chronic depression or a range of maternal psychosocial problems which may have adverse consequences for children (Bernard-Bonnin, Canadian Paediatric Society, & Mental Health and Developmental Disabilities Committee, 2004; Kernot et al., 2015; Stellenberg & Abrahams, 2015). For example, studies have reported that postnatal depression is significantly related to more hostile, negative parenting (Lovejoy et al., 2000; National Research Council and Institute of Medicine, 2009), meaning that women in this sample who suffer with postnatal depression may be more likely to shake their children.

The Edinburgh Postnatal Depression Scale is a 10-item self-report scale, and items are scored on a 4-point Likert-type scale. Item responses differ qualitatively between questions, and the most common response option was: 0 (*no, not at all*), 1 (*no, not much*), 2 (*yes, sometimes*), and 3 (*yes, most of the time*). Participants could score a minimum total score of 0 and a maximum of 30. Items 3 and 5 to 10 were reverse scored, and recommended cut-off scores determined the severity of postnatal depression, these were: 9 – 10 (*possible depression*), 12 – 13 (*probable depression*), and 14 – 15 (*antepartum depression*; Gibson, McKenzie-McHarg, Shakespeare, Price, & Gray, 2009). Because the Edinburgh Postnatal Depression Scale is a screening instrument, scores in this study represent the risk for

postnatal depression rather than a diagnosis per se. Item 10 in the scale, "*The thought of harming myself has occurred to me*…", was earmarked as important because it identified individuals with suicidal thoughts in the past week, and these participants were referred for free counselling at the end of the interview.

In terms of scale design, the Edinburgh Postnatal Depression Scale proved to be a reliable measure of postnatal depression in a sample of impoverished isiXhosa women in Khayelitsha (i.e., a peri-urban settlement), Cape Town (De Bruin, Swartz, Tomlinson, Cooper, & Molteno, 2004). Moreover, a confirmatory factor analysis of the 10-item interviewer-administered isiXhosa version revealed a single factor structure for the scale (meaning that all items measured the same construct: postnatal depression), and the internal consistency was satisfactory, α = .89 (De Bruin et al., 2004). In another study conducted in South Africa, the reliability of the English version was also satisfactory (α = .72) when used with mothers from low socioeconomic backgrounds (Madu & Roos, 2006). Together, the independent studies reflect that the Edinburgh Postnatal Depression Scale was suitable for use with caregivers who have different native languages, and that a similar adaptation (like an Afrikaans version, as designed for this study) could prove reliable. The English version of the Edinburgh Postnatal Depression Scale also revealed excellent test-retest reliability (*ICC* = .92) in a sample of mothers with babies younger than one year old in Australia – the age specific focus of this study (Kernot et al., 2015).

Community violence. The Survey of Exposure to Community Violence was developed to assess children's' exposure to community violence, but given that there are few standardised measures that can accurately examine adults' exposure to community violence, the scale was used in this study for the latter purpose (Richters & Saltzman, 1990). This decision was informed from a recent meta-analytic review which showed that the Survey of Exposure to Community Violence was the most reliable and widely used scale in studies of community violence in adult samples (DeCou & Lynch, 2015).

Using this scale, community violence is defined as the exposure to direct (i.e., victimisation) and indirect (i.e., witnessing) violence in a public setting, and can include, for example, being hit by a family member, being stabbed (or seeing this action), or seeing a dead body (Scarpa et al., 2002). In terms of exposure to community violence and the potential for shaking children, this study suggests that caregivers who are exposed to more violence may be (unintentionally) more likely to shake their children for two possible reasons. First, caregivers who are frequently exposed to community violence may be socialised into accepting violence as normal behaviour (or may be desensitised to violence). Second, caregivers living in these communities may experience higher levels of stress,

depression, or anxiety – such mental health consequences could negatively impact on parenting capabilities, thereby increasing the risk for shaking.

The Survey of Exposure to Community Violence is a 54-item self-report questionnaire, but in considering time constraints and participant burden, the scale was adapted to 25 items – other studies have modified the scale in a similar way (Mitchell et al., 2009; Scarpa, 2001). Usually, the Survey of Exposure to Community Violence is scored on a 9-point Likert-type scale, but as with other scales in this study, the criterion was changed so that participants could understand the response options more easily. Therefore, items were scored on a 3-point Likert-type scale, and responses ranged between: 0 (*never*), 1 (*a few times*), and 2 (*more than 10 times*). Participants could score a minimum total of 0 and a maximum of 50, and higher scores indicated more exposure to community violence.

Notably, few studies have examined exposure to community violence in adult samples, and inconsistencies in definition as well as different versions of the same measure make it difficult to directly compare scale outcomes (DeCou & Lynch, 2015). In considering these challenges, the Survey of Exposure to Community Violence has relatively strong psychometric properties compared to other measures that have examined adults' exposure to community violence (DeCou & Lynch, 2015). For example, the scale revealed adequate reliability in a sample of single African American mothers in the United States ($\alpha = .74$; Mitchell et al., 2009). It is the hope that the adapted Survey of Exposure to Community Violence used in this study will reflect similar reliability estimates.

History of childhood abuse. The ISPCAN Child Abuse Screening Tool – Retrospective Version is one of three ICAST (ISPCAN [International Society for the Prevention of Child Abuse and Neglect] Child Abuse Screening Tools) tools used to measure childhood abuse (Runyan, Dunne, & Zolotor, 2009). Specifically, it assesses an individual's retrospective report of abuse that they may have suffered during their childhood (i.e., less than 18 years old), according to four scales: physical abuse, emotional abuse, sexual abuse, and neglect. Owing to time constraints in this study, only the physical and emotional abuse scales were examined in terms of the potential relationship to shaking children. This was because research has shown a link between a history of childhood physical abuse and becoming a perpetrator of physical violence later on in life (Bartlett, Kotake, Fauth, & Easterbrooks, 2017). Similarly, the neglect scale was excluded because it is suggested that it might have been difficult for individuals from marginalised areas (as per the study sample) to recall and differentiate between poverty and neglect that may have occurred during their childhood.

Of note, the ISPCAN Child Abuse Screening Tool – Retrospective Version was originally designed for and has been validated with individuals between 18 to 26 years old. The age range in this study (i.e., 18 to 60 years old) exceeded the original age limit of the scale, although it was still used because a comparable instrument to measure history of childhood abuse could not be found.

Owing to time constraints, and because this study did not require the full content of the scale, it was adapted, including how the scale was scored so that response options were easier to recall. The 36-item scale was narrowed down to include 11 items, scored on a 3-point Likert-type scale: 0 (*never*), 1 (*sometimes),* and 2 (*most of the time*). Participants could score a minimum total of 0 and a maximum of 22, and higher scores indicated greater physical and/or emotional childhood abuse.

In the initial validation study, the ISPCAN Child Abuse Screening Tool – Retrospective Version was tested in seven countries (in six different languages), and internal consistency scores were moderate (physical abuse scale: $\alpha = .61$; emotional abuse scale: $\alpha = .63$; Dunne et al., 2009). Because the scale is a fairly new measure of childhood abuse, it needs to be tested in other contexts to better determine its reliability and validity, including within South African samples. The results from this study will contribute towards the literature by establishing the psychometric properties for an adapted version of the ISPCAN Child Abuse Screening Tool – Retrospective Version for use with female caregivers in low-income settings in South Africa.

Social support. The Medical Outcomes Study Social Support Scale was used to assess participants' functional support, as measured by four subscales: tangible support (practical aid and assistance), affectional support (love and affection), positive social interaction (taking part in activities with others), and emotional support (providing guidance and feedback; Robitaille, Orpana, & McIntosh, 2011; Sherbourne & Stewart, 1991). Because research has shown that social support can protect against child maltreatment (Gay, 2005), caregivers with lower levels of social support may be more likely to shake their children.

The Medical Outcomes Study Social Support Scale is a 20-item questionnaire: 19 items assess functional support and one item determines structural support. In this study, the 19 items were modified from a 5-point Likert-type scale to a 3-point scale, and item responses ranged between: 1 (*most of the time*), 2 (*some of the time*), and 3 (*none of the time*). Participants could score a minimum total score of 1 and a maximum of 57. In hindsight, the original design of the scoring system was counter-intuitive, so all items were reverse scored so that higher scale scores meant that participants had more social support.

In a national survey of English-speaking older adults, the Medical Outcomes Study Social Support Scale had high internal consistency (Cronbach's alpha range: .90 to .97) and high composite reliability (range: .93 to .97; Robitaille et al., 2011; Sherbourne & Stewart, 1991). In another study that examined the effect of social support on medication adherence in English and isiZulu individuals in KwaZulu-Natal, South Africa, the scale achieved moderate reliability ($\alpha = .64$; Ncama et al., 2008). Taken together, the Medical Outcomes Study Social Support Scale appears to be an adequate measure of social support with varied populations, and is expected to produce similar estimates in the current sample.

Knowledge of the dangers of shaking. The Shaking Knowledge Scale (Barr et al., 2009a) assessed participants' knowledge of the dangers of shaking. Because the main focus of this study was to determine if caregivers have shaken their children, it was imperative to examine if there was a relationship between knowledge of the dangers of shaking and actually having shaken an infant. This is supported by research which found that the risk for shaking decreased as people knew more about the dangers of shaking (Altman et al., 2011).

The 5-item scale was changed to a 6-item scale and included the added statement: "Shaking a baby for less than five seconds is not harmful to the baby". This item was included because a recent study reported that vigorously shaking an infant for as little as 3 to 5 seconds can cause serious injury (Kelly & Farrant, 2008).

Items were scored on a 3-point Likert-type scale and items 1, 2, and 3 were reverse scored. Item response options were: 1 (*disagree*), 2 (*not sure*) and 3 (*agree*). Participants could score a minimum total score of 6 and a maximum of 18, and higher scores indicated more knowledge of shaking. Despite a thorough search of the literature, reliability and validity estimates of the Shaking Knowledge Scale by Barr et al. (2009a) were not found.

Sample Size Calculation

The program G*Power Version 3.1.9.2 was used to conduct an a priori power analysis (Faul, Erdfelder, Lang, & Buchner, 2007). The threshold for statistical significance was set at $\alpha = .05$, and results indicated that in order to have an 80% chance of detecting small effects ($r = .05$) with 14 predictors of child maltreatment using regression analyses, 379 participants were needed. My final sample of $n = 385$ slightly exceeded the sample requirement.

A small effect size was chosen to increase the chance of detecting significant effects, because previous research has demonstrated that the effect sizes for the predictors of child maltreatment vary. For example, studies report that children are more likely to be maltreated by younger parents (range: $r = -.12$ to $-.33$), mothers with less social support ($r = -.32$) or maternal depression (range: $r = .22$ to $.73$), and parents who abuse alcohol ($r = .21$; Black et al., 2001; Chaffin, Kelleher, & Hollenberg, 1996; Chan, 1994; Connelly & Straus, 1992;

Pianta, Egeland, & Farrell-Erickson, 1989; Straus et al., 1998; Whipple & Webster-Statton, 1991).

Procedure

While the Research Ethics Committee of the Department of Psychology at the University of Cape Town reviewed the study for approval, public clinics in the Southern and Tygerberg sub-districts of the Western Cape Province were approached as potential sites of research. In the process, relationships with the clinic staff were established, helping ease administration processes at the requested clinics once the study was approved by the City of Cape Town, City Health.

Two bilingual research assistants (English: Afrikaans, English: isiXhosa) were employed to assist with data collection. A week before the interviews started, the researchers were trained in all administrative procedures to ensure that each interview would be delivered in a standardised manner. This included both researchers role-playing the questionnaire in their mother tongue and subsequently comparing the translated version back to the English questionnaire – this process helped identify errors in translation and grammar which were then corrected. For data collection, each researcher was given a name badge that identified her as a research assistant associated with the University of Cape Town, and a bag that contained the final printed questionnaires, participant snacks and refreshments, tubs of Bennett's Baby Bum Crème, and a lifelike infant doll. The study was piloted at one of the clinics for a day to ensure that all testing procedures were suitable to the environment, and after that, the formal data collection began.

Each morning before patient appointments, a list of all potential participants with children younger than one year was made, sourced from patient folders provided by the clinic receptionist. The folder system differed between the clinics, although two of the clinics followed the same colour-coded system, i.e., pink folders (immunisation), blue folders (sick children), and yellow folders (vitamin injection and weight). This colour-coded system made it hard to locate patients at times, because as nursing responsibilities differed according to the colour-code, so did the location of the respective participants. The third clinic had a simpler system: all patient folders went to one nurse where children were first weighed in the same room, and only thereafter sent to a different nurse. This latter system made it easier to keep track of patient folders (and hence, maintain the systematic sampling method) because they were not scattered between rooms, and patients were less likely to be missed.

When the participant list had been made, the clinic manager or a researcher would introduce the study team (in the most appropriate language per clinic site) to all patients waiting for clinic services using a brief introductory guide (see Appendix H). This guide

explained to the caregivers that they were invited to participate in a study that aimed to understand how they experienced and coped with their infant's crying. Every second mother or caregiver was then selected from the participant list, starting at the beginning of the list (thus simple random sampling was used to identify potential participants). On days when there were few patients at the clinic, all were invited to be interviewed. The list was shared among the three study staff members (the principal researcher and the two assistants) so that the system of sampling was maintained throughout the day. When a person was selected for participation, a researcher called out the individual's name, took her to a private location within the clinic, and invited her to take part in a one-on-one, forty-minute interview. Only the participant's children (who were, by definition, usually too young to understand the content of the questionnaire) were allowed into the interview, and if the individual had previously participated, sampling with replacement was used.

Although this method of sampling was planned in order to draw a systematic, random sample, some difficulties did arise. Firstly, all three researchers needed to interview caregivers in order not to disrupt the flow of patients through the clinic. As the principal researcher was responsible for compiling the participant list, this meant that if new patient folders were provided while the researcher was conducting an interview (as occasionally did happen), potential participants were lost. Second, the demand at each clinic differed daily, and when nurses attended to patients more quickly, participants were missed because there had not yet been the opportunity to ask them to participate. When a researcher missed participants, she would continue to sample every second participant from the list as originally intended. Participants who were missed, were missed on the basis of the speed at which nurses worked, and therefore could be considered to have been missed randomly, rather than because of specific mother or infant characteristics related to infant crying or shaking.

Participants were interviewed simultaneously by the researchers in separate rooms within the same clinic. Room availability within each clinic differed on a daily basis (and was a practical struggle for the research) because different staff worked on different days (for instance, each clinic had a nutritionist who only came in on particular days), and these space constraints ultimately influenced where the study was conducted. For example, many clinics were not included in this study because they simply did not have the space available to accommodate the research.

Once in the private room, a researcher first assessed a participant's eligibility for inclusion using the Participant Screening Checklist (see Appendix A). This checklist ensured that if language barriers were present, the researcher could decide against conducting the interview. It was important to identify language barriers because if participants

misunderstood the questions being asked, this would prevent the caregiver from giving truly *informed* consent, and could also bias the study findings. The checklist also ensured that the participant was the infant's primary caregiver, the participant was older than 18 years, and that the person had not previously participated. In saying this, some women did appear to have participated twice in order to receive the study incentive (i.e., snacks and a baby care product). This was only detected at the end of the study when it became evident that some names and signatures were duplicated on the consent forms. In these cases, the data from the second interviews were not included in this study.

When participants had given written informed consent for participation, the researcher gave the participant a packet of biscuits and a soft drink which they could have during the interview. This food incentive seemed to make the respondents feel more comfortable, especially since interviews, in general, can be daunting. Throughout the interview, the researcher read the questionnaire to the participant and recorded all answers with a pen. The onus was on the researcher to record information accurately and to ensure that participants did not misunderstand the questions being asked. The researcher also demonstrated certain behaviours (like shaking or smacking a child) using a lifelike infant doll so that participants did not misinterpret the intended action in question. If a child that was present in the interview could understand the study questions, the researcher would ask the participant to read questions of a sensitive nature to themselves from the paper, if she could.

At the end of each interview, the researcher debriefed the participant and thanked her for her time. The researcher also provided printed copies of the informed consent, debriefing form, and the abusive head trauma information brochure to the participant (see Appendices D, E, and F). The researcher requested participants to place all study material out of sight of the other caregivers, and not to discuss the interview with anyone in the clinic. By prior arrangement with the clinic staff, if a participant had missed her clinic appointment while in the interview, the respondent would be seen to next in order to avoid any undue delays.

When a participant needed further support (e.g., counselling), that individual was referred by the research team to the principal researcher (myself) who then provided the participant with a referral letter for the relevant organization, in consultation with my supervisor (see Appendix I).

At the end of each day of data collection, the principal researcher collected the bags from the assistants and stored the completed questionnaires in a locked filing cabinet. Supplies were refilled for the following day with new questionnaires, participant snacks and incentives, and the bags were given to the researchers each morning.

When data collection concluded, the study data was entered onto a password-protected computer that only the principal researcher had access to. One hundred and fifty printed copies (including laminated versions) of the Afrikaans, English, and isiXhosa abusive head trauma information brochures (see Appendix F) were supplied to all three clinics following completion of the research component of the study. These brochures were provided to ensure that all female caregivers at the clinics had access to information about the dangers of shaking, regardless of participation. Pamphlets were only provided at the end of the study so as to avoid inadvertent dissemination of the information through the sample. Since parents will inevitably make multiple visits to the clinic, all caregivers who were potentially in this sample were highly likely to receive a brochure.

Data Management and Statistical Analyses

After data collection, quantitative data was captured using Microsoft Excel and qualitative data was entered using Microsoft Word. All quantitative data were analysed using R Version 3.4.0 and RStudio Version 1.0.143 (R Core Team, 2017; R Studio Team, 2015). The five study aims were investigated using both quantitative and qualitative methods of analyses; the analysis procedures that follow are described aim by aim.

Missing data. The *k*-nearest neighbour imputation method was used to replace data which appeared to be missing at random (the missing data was less than 5% of the total data). This method is one of the more advanced techniques to correct for missing data and outperforms most other methods, including for example, the mean imputation method (Batista & Monard, 2017). Using the default setting of $k = 5$, each missing data point was determined from the five nearest data points to that missing value.

Reliability of study scales. Most studies in psychology report coefficient alpha, otherwise known as Cronbach's alpha, as a measure of the internal consistency reliability of a test scale. In recent times, however, it has been recognised that there are many deficiencies of coefficient alpha, although it continues to be reported because alternatives are not widely known (Dunn, Baguley, & Brunsden, 2014). One of the main problems of coefficient alpha is that it relies on assumptions which are seldom met in psychological research, viz., assumptions of the essentially tau-equivalent model (Dunn et al., 2014). Violation of these assumptions results in inflated estimations of internal consistency and studies therefore run the risk of reporting inaccurate research findings (Dunn et al., 2014).

For this research, coefficient omega (alternately known as McDonald's omega) was used to measure scale reliability; this measure has in recent years been described as the best estimate of scale reliability (Dunn et al., 2014; Revelle & Zinbarg, 2009; Zinbarg, Yovel, Revelle, & McDonald, 2006). In addition, the level of reliability was calculated for each

estimate using a bootstrapped 95% confidence interval with 1,000 re-samples (Dunn et al., 2014). Confidence intervals aid in the interpretation of point estimates and are a familiar benchmark for statistical reporting in the social science disciplines (Dunn et al., 2014). Because McDonald's omega is not commonly reported in psychological research, I also report Cronbach's alpha for comparison.

In R, the function 'omega' from the 'psych' package performs an exploratory factor analysis on the original data set of a scale, and thereafter calculates omega expressed as a point estimate between 0 and 1 (Revelle, 2017). The purpose of this analysis is to identify groups of items (i.e., factors) which together explain a common construct, e.g., postnatal depression. The recommended cut-off heuristic of .70 was used to indicate acceptable scale reliability (Dunn et al., 2014; Nunnally & Bernstein, 1994). Because most scales in this study were new or had been adjusted, an exploratory factor analysis was conducted on each scale. Final scales included items with a recommended factor loading greater than .30, and a communality score (the variance in the observed item accounted for by a common factor) greater than .20 (Child, 2006; Yong & Pearce, 2013). Items with low communalities are typically removed because they are less likely to explain the variance accounted for by a common factor (Child, 2006; Yong & Pearce, 2013).

Descriptive statistics. Frequencies, measures of central tendency (i.e., the mean), and measures of variability (i.e., the standard deviation and range) summarise the demographic information of the study sample.

Aim 1. In order to determine if participants had shaken, or had thoughts of shaking their children, frequencies of the "shaking component" from the six questions in the Shaken Baby Scale (see Appendix G, Section D) are reported. Bootstrapped confidence intervals were calculated using 1,000 re-samples to in order to confirm the accuracy of the reported frequencies.

Aim 2. To identify the triggers of shaking, a content analysis of participants' responses to a question was conducted. The question asked: "Previously, you mentioned that you have shaken your baby when his or her crying frustrated or upset you. Can you please show me what happened and tell me a little more about this?" (see Appendix J). To explore the participants' subjective experiences of shaking, a thematic analysis of the responses to this question was also conducted.

Aims 3 and 4. Aims three and four were assessed in the same manner, i.e., using a hierarchical logistic regression analysis.

Table 3

Hierarchy of Predictors for the Regression Analyses

Domain	Predictor	Order
Context	1. Poverty (i.e., household hunger)	Most distal
	2. Community violence	
	3. Social support	
	4. Employment status	
Participant characteristics	5. History of childhood abuse	Distal
	6. Relationship status	
	7. Participant age	
	8. Intimate partner violence	
	9. Alcohol use	
	10. Postnatal depression	
Infant characteristics	11. Infant gender	Neutral
	12. Infant age	
Participant cognition and behaviour	13. Knowledge of the dangers of shaking	Proximal
	14. Responses to infant crying	
	15. Inconsolable crying	
Participant intention	16. Thoughts of shaking	Most Proximal

Because this study is the first to investigate whether shaking is a form of child maltreatment in South Africa, it is unclear which risk factors might predict shaking a child, having thoughts of shaking, or knowing of the dangers of shaking. As such, Bronfenbrenner's ecological systems theory (Bronfenbrenner, 1979) was applied to inform the order of entry of the predictors into models, beginning with the more distal predictors for child maltreatment and ending with the more proximal predictors (see Table 3). Therefore, the potential predictors were entered into each analysis in the same sequence.

For each aim, a correlation matrix of the Pearson's correlation coefficients was used to examine the relationships between the study variables. Because this study included many potential predictors, non-significant variables were removed after each step of analysis to reduce the effect of unwanted variables. To determine if a model was significantly better than the model before it, the chi-square statistic was examined. This statistic represents the change in the residual deviance between two different models, meaning that if the change between

two models is significant, the latter model is the better model. Final models were cross-validated using a *k*-fold validation set, with $k = 10$.

In R, the package 'Dharma' was used to examine the residuals of the final models (Hartig, 2017). Dharma uses a simulation-based approach to create readily interpretable scaled residuals between 0 and 1 (the interpretation is analogous to linear models; Hartig, 2017). Models with quantile-quantile (q-q) plots (for normality) and goodness-of-fit tests assessing uniformity of the residuals, over-dispersion, under-dispersion, and zero-inflation were also assessed (Hartig, 2017). Final models were examined for multicollinearity using the variance inflation factor (less than 10), tolerance values (greater than 0.1), and standard error estimates. The partial odds ratios were calculated by exponentiating the model coefficients – sometimes the ratio was inverted for easier interpretation.

Aim 3, part 1. This aim examined the relationship between shaking (i.e., whether or not an infant was shaken = dependent variable) and the potential predictors. Shaking was assessed using question 1 from the Shaken Baby Scale: "When your baby cries, how often have you shaken your baby?". The scale had three frequency response options which were then dichotomized: 0 (*no, I have not shaken my baby)* and 1 (*yes, I have shaken my baby*).

Aim 3, part 2. To examine if any risk factors predicted having thoughts of shaking (i.e., the degree of thoughts of shaking = dependent variable), responses from the Thoughts of Shaking Subscale (items 2 to 6 in Appendix G, Section D) were used. Initially, this aim was going to be assessed using a hierarchical multiple linear regression analysis, but the distribution of the dependent variable was very positively skewed (see Figure 1, Appendix K). Using a log transformation, the right-skew distribution was corrected; scores of 0 remained 0, and scores between 1 and 7 = 1. Thereafter, a hierarchical logistic regression analysis was conducted.

Aim 4. To assess if the risk factors predicted knowledge of the dangers of shaking (i.e., the degree of knowledge = dependent variable), a hierarchical multiple linear regression analysis was also going to be conducted. Because the distribution of the dependent variable was negatively-skewed (see Figure 2, Appendix K), the scores were corrected using a log transformation; scores of less than 9 = 0, and scores equal to or greater than 9 = 1.

Aim 5. To identify the indigenous methods that participants used to console their infants, a content analysis was conducted using the participants' responses to questions concerning infant crying (see Table 1 as a reminder of the questions). Because inconsolable crying is recognised as the primary trigger for shaking, the ways in which caregivers responded to their infant's cry may be identified as risky or protective.

Chapter 3: Results

Scale Reliability

After an exploratory factor analysis was conducted on each scale, final scales included items with a recommended minimum factor loading of .30 and for the most part, a communality score of .20 or higher (Child, 2006; Yong & Pearce, 2013).

Table 4
Final Items in the Responses to Infant Crying Scale

When your baby fusses or cries, how often do you…	
Retained items	
3.	Pass your baby to someone else for a while?
5.	Take your baby for a walk in his or her pram, on your back, or in a kangaroo carrier?
6.	Put your baby down in a safe place and walk away because you felt frustrated?
7.	Tell other people who take care of your baby what to do if they become frustrated with your baby's crying?
8.	In general, how often do you tell other people who take care of your baby about when or why babies cry?
15.	Leave your baby in a safe place and check on him or her every few minutes?
Removed items	
1.	Pick up your baby?
2.	Walk around with your baby?
4.	Feel irritable, angry, upset, or depressed?
9.	Take a break from the sound of crying?
10.	Tell yourself that the crying will end?
11.	Tell yourself that your baby is okay?
12.	Tell yourself that there is nothing you can do?
13.	Tell yourself it is not your fault that your baby won't stop crying?
14.	Feel guilty if you can't make your baby stop crying?

The final Responses to Infant Crying Scale had six items. Looking at these items qualitatively, the responses to infant crying are practical, action-oriented responses.

In the Thoughts of Shaking subscale (items 2 to 6 in Appendix G, Section D), item 6 had a factor loading of .60 and a communality score of .36. Even though this item met the suggested inclusion criteria, it was removed it because it differed qualitatively (item 6 asked

if it was acceptable behaviour for others to shake a child, whereas the remaining scale items asked participants if they themselves would shake their child).

The three scales from the Shaken Baby Syndrome Awareness Assessment – Short Version were problematic because the communality scores and factor loadings did not meet the recommended minimum criteria of .20 and .30, respectively. Removing items from the scales did not improve the outcome. These scales were not used further in this study.

Table 5

Final Items in the Revised Conflict Tactics Scale Short Form

	Question
Retained items	
2.	My partner insulted or swore or shouted or yelled at me.
3.	I had a sprain, bruise, small cut, or felt pain the next day because of a fight with my partner.
5.	My partner pushed, shoved, or slapped me.
6.	My partner punched or kicked or beat-me-up.
7.	My partner destroyed something belonging to me or threatened to hit me.
8.	I went to a doctor or needed to see a doctor because of a fight with my partner.
Removed items	
1.	My partner explained his or her side or suggested a compromise for a disagreement with me.
4	My partner showed respect for, or showed that he cared about, my feelings about an issue we disagreed on.
9.	My partner used force (like hitting, holding down, or using a weapon) to make me have sex.
10.	My partner insisted on sex when I did not want to or insisted on sex without a condom (but did not use physical force).

The final Revised Conflict Tactics Scales short form consisted of six items which measured direct physical violence. Four items were removed owing to low communality scores (range: .10 to .17).

For the Alcohol Use Disorders Identification Test, all items were retained even though item 9 had a slightly low communality score of .19 (.01 short of the recommended level of .20). All items were retained in this scale so that the findings could be compared to other

studies that have also used the test with similar samples (Kader et al., 2012). Moreover, coefficient omega was still adequate with all items included, ω_t =.90.

For the same reason of comparing the full scale to previous research, all items in the Edinburgh Postnatal Depression Scale were retained despite having three items (i.e., items 1, 2, and 10) with lower communality scores (range: .14 to .17). The overall scale reliability with all items included also indicated that this was an acceptable decision, ω_t = .81. One possible reason as to why the items had lower communalities is because they differed qualitatively; items 1 and 2 assessed anhedonia, item 10 assessed thoughts of self-harm, and the other items assessed symptoms of anxiety or depression (see Appendix G, Section H; Coates, Ayers, & de Visser, 2017).

Table 6

Final Items in the Shaking Knowledge Scale

Item	Statement
Retained items	
1.	Shaking a baby is a good way to help a baby stop crying.
2.	Shaking a baby for less than five seconds is not harmful to the baby.
4.	Shaking a baby can be very dangerous and can cause serious injuries.
5.	Shaking a baby can kill a baby.
Removed items	
3.	Sometimes infant crying can be so frustrating or upsetting that I can see how someone might shake a baby.
6.	If shaking a baby is dangerous, parents should tell other caregivers who look after their baby about the dangers of shaking a baby.

The final Shaking Knowledge Scale included four items, as summarised in Table 6. Items 3 and 6 were removed because they did not load well (range: .00 to .35) and had low communality scores (range: .06 to .16).

Table 7

Final Items in the Survey of Exposure to Community Violence

	How many times in the last year have you witnessed …
Retained items	
1.	Someone being chased?
3.	Someone being threatened?
4.	Someone being hit by a family member?
5.	Someone being hit by a non-family member?
6.	Someone being beaten or mugged?
8.	Someone being stabbed?
9.	Someone being shot?
10.	A gun or knife?
13.	Someone wounded?
14.	Someone killed?
15.	A dead body?
	How many times in the last year have you been a victim of…
17.	Being chased?
20.	Being threatened?
21.	Being hit?
22.	Being beaten or mugged?
Removed items	
	How many times in the last year have you witnessed …
2.	A break in (other's home)
7.	Sexual assault
11.	Gunfire outside, in or near your home
12.	Gunfire in the home
16.	Suicide
	How many times in the last year have you been a victim of…
18.	Break in (while at home)
19.	Break in (not while at home)
23.	Sexual assault
24.	Stabbed
25.	Shot

Table 8

Reliability of the Measures Employed

Scale	ω_t	95% CI*	α	95% CI*
Household Hunger Scale	.73	[.68, .78]	.71	[.64, .76]
Responses to Infant Crying Scale	.80	[.77, .83]	.79	[.75, .82]
The Thoughts of Shaking Subscale	.95	[.92, .96]	.94	[.92, .96]
Shaken Baby Syndrome Awareness Assessment Short Version				
Discipline techniques scale	.49	[.25, .64]	.59	[.52, .67]
Soothing techniques scale	.42	[.29, .54]	.40	[.30, .50]
Potential for injury scale	.16	[.05, .30]	.22	[.06, .32]
The Revised Conflict Tactics Scales Short Form	.90	[.86, .92]	.89	[.85, .92]
The Alcohol Use Disorders Identification Test	.90	[.87, .92]	.87	[.84, .91]
The Edinburgh Postnatal Depression Scale	.81	[.78, .84]	.80	[.76, .83]
The Survey of Exposure to Community Violence	.89	[.87, .90]	.88	[.86, .89]
The ISPCAN Child Abuse Screening Tool – Retrospective Version	.83	[.79, .87]	.82	[.78, .86]
The Medical Outcomes Study Social Support Scale	.92	[.91, .94]	.92	[.91, .94]
The Shaking Knowledge Scale	.71	[.61, .74]	.71	[.59, .74]

Note. ω_t = Coefficient omega. α = Coefficient alpha. * The 95% confidence interval (CI) is a bootstrapped calculation using 1,000 re-samples.

Owing to low factor loadings (range: .00 to .44) and low communality scores (range: .02 to .19), ten items were removed from the Survey of Exposure to Community Violence. The final scale consisted of 15 items (see Table 7). For the ISPCAN Child Abuse Screening Tool – Retrospective Version, item 5 was removed because it had a low communality score of .13. The adjusted final study scales are reported in Table 8 and indicate overall scale reliability for this study.

Assessment of Multicollinearity

For the final models in aims 3 and 4, the findings from the q-q (quantile-quantile) plots showed that the residuals did not deviate from the expected distributions, and there were no concerns of over-dispersion, under-dispersion, or zero-inflation (see Figures 3, 4, 5, and 6, Appendix L). A one-sample Kolmogorov-Smirnov test confirmed the findings (e.g., D = 0.04, p = .421) for each model, showing that the residuals were not significantly different from the expected distribution. The variance inflation factors and tolerance values were all within an acceptable range, and the standard error estimates were not large. Overall, there were no concerns of multicollinearity in the final models.

Table 9

Demographic Characteristics of the Study Sample

Characteristic	*n*	%
Participants	385	100.0%
Biological mother	375	97.4 %
Grandmother	7	1.8 %
Foster mother	1	0.3 %
Aunt	1	0.3 %
Nanny	1	0.3%
Household income per year	385	100.0%
Less than R50,000	365	94.8 %
Between R50,000 and R100,000	17	4.4 %
More than R100,000	3	0.8 %
Relationship status	385	100.0%
In a relationship	358	93.0 %
Single	27	7.0 %

Table 9 cont.

Characteristic	*n*	%
Live with partner if not single	358	100.0%
Yes	266	74.3 %
No	92	25.7 %
Employment	385	100.0%
No	287	74.5 %
Yes	98	25.5 %
Type of employment	98	25.4 %
Full-time	69	17.9 %
Part-time	29	7.5 %
Language of questionnaire	385	100.0%
English	272	70.6 %
Afrikaans	75	19.5 %
IsiXhosa	38	9.9 %
Clinic	385	100.0%
Seawinds	257	66.7 %
Grassy Park	95	24.7 %
Valhalla Park	33	8.6 %
Ethnicity	385	100.0 %
Coloured	235	61.0 %
Black South Africans	110	28.6 %
Other Black Africans	40	10.4 %
Referral	53	13.8 %
Yes	38	9.9 %
Refused	15	3.9 %
Highest level of education	385	100.0 %
Did not complete high school	246	63.9 %
Completed high school	105	27.3 %
Completed primary school	20	5.2 %
Tertiary education	7	1.8 %
Did not complete primary school	6	1.6 %
Currently in high school	1	0.2 %

Table 9 cont.

Characteristic	*n*	%
Child Support Grant	385	100.0 %
No	216	56.0 %
Yes	169	44.0 %
Home language	385	100.0 %
Afrikaans	134	34.8 %
Other	75	19.5 %
English	68	17.7 %
IsiXhosa	54	14.0 %
English or Afrikaans	47	12.2 %
English or IsiXhosa	7	1.8 %
Age (years)		
M (SD)	27.3 (7.5)	-
Range	18:60	-
Household size		
M (SD)	5.0 (2.08)	-
Range	2:16	-
Children (< 18 years) per household		
M (SD)	2.4 (1.54)	-
Range	1:14	-
Children (< 18 years) per participant		
M (*SD*)	2.2 (1.24)	-
Range	1:10	-
Infant characteristics		
Age (months)		
M (SD)	5.8 (3.48)	-
Range (weeks: months)	1:12	-
Gender	385	100.0 %
Male	198	51.4 %
Female	187	48.6 %

Sample Characteristics

Demographic characteristics of the sample are reported in Table 9. Three hundred and ninety-eight mothers and other primary female caregivers with infants younger than one year were interviewed. The final sample, however, consisted of 385 participants as 13 participants were removed from the study: 7 participants were younger than 18 years, 3 participants had infants older than one year, and 3 participants had participated twice. When a minor had taken part, it was thought that (because the age criterion was explained during the informed consent process, and they had then indicated that they were 18 or older) that the participant was old enough to participate. However, when the participant's age was calculated (using the individual's birthdate) during data capture, it became apparent that some individuals were under age. These participants were excluded from all further analyses in this study, on the assumption that the birthdate was the accurate data.

In the final sample, the average age of participants was 27 years (*SD* = 7.5), and most participants were the infants' biological mothers (97.4%, *n* = 375). Women were most likely to identify as Coloured (mixed ethnic origin, 61%, *n* = 235) or Black South African (28.6%, *n* = 110), and the remaining participants were Black Africans from other countries (10.4%, *n* = 40). Most participants spoke Afrikaans or English, although the majority of participants chose to be interviewed in English (70.6%, *n* = 272).

Most women had not completed high school (63.9%, *n* = 246), were unemployed (74.5%, *n* = 287), and their household income (i.e., the combined income of all individuals in a household per year) was less than R50,000 per year (94.8%, *n* = 365; < $3,661). Nearly half of the sample (56%, *n* = 216) reported receiving a Child Support Grant, indicating that these participants earned less than R3,800 ($320; if single) or R7,600 ($641; combined income if married) per month (Hall & Sambu, 2018b).

Thirty-eight participants (9.9%) were referred for further (free) counselling support and 15 participants (3.9%) refused a suggested referral. In general, referrals and refused referrals were for issues of postnatal depression, intimate partner violence, and alcohol use. Overall, most women had two co-occurring issues, and the combination of intimate partner violence and postnatal depression was most common in both groups.

In one instance, confidentiality was broken because one participant's child was judged by the research team to be at risk of physical harm. The infant had what appeared to be recent burn marks on her face, and was handled quite roughly during the interview. Upon enquiry, the infant's caregiver also reported that the child had suffered a stroke and was being cared for at the Red Cross War Memorial Children's Hospital. This information, as well as an

upcoming doctor's appointment, was confirmed by a healthcare practitioner who worked at the Red Cross hospital, and who reviewed the child's medical records.

Regarding the infants in this study, most children were on average younger than six months old. The proportion of boys and girls was also fairly equal; the figures were 51.4% (*n* = 198) and 48.6% (*n* = 187), respectively.

Aim 1: Shaking and Thoughts of Shaking

Results from the Shaken Baby Scale (See Appendix G, Section D) are reported in Table 10 and detail the incidence of shaking as well as the incidence for the thoughts of shaking.

In response to the question: "When your baby won't stop crying (or cries), how often have you shaken your baby?", it initially appeared that 70 (18.2%) women had shaken their babies. However, in considering the participants' qualitative responses to a follow-up question (See Appendix G, Section M) that asked the women to describe their experiences of shaking, 19 (4.9%) responses were removed because they were not confirmed cases of violent shaking. In these instances, it was determined that the caregivers had rocked their infants to soothe or play with the child, and this rocking was not harmful to the child.

The remaining 51 (13.2% of the sample) responses were definite cases of violent shaking, and boys (63% of this shaken sub-sample, *n* = 32) were nearly twice as likely to be shaken in comparison to girls (37%, *n* = 19). Boys (age in months: *M* = 7.20, *SD* = 3.54) and girls (age in months: *M* = 7.01, *SD* = 3.41) that were shaken were of similar age at the time of the interview, regardless of gender. In terms of frequency, most participants reported shaking their infant "sometimes" (92.1%, *n* = 47), while others reported shaking "a lot of the time" (7.9%, *n* = 4).

Items 3 to 6 in Table 10 document participants who had thoughts of shaking; the highest proportion indicates that 77 participants (20% of the full sample) reported that they had, at some point, wanted to shake their baby in response to infant crying. Participants also reported that they wanted to shake their infant when: (1) they felt angry, frustrated, or upset in response to infant crying (16.8%, *n* = 65), (2) as a last resort when alternative methods of soothing did not work (17.7%, *n* = 68), and (3) when the participant felt overwhelmed as a new mother (18.4%, *n* = 71). Most participants (92.4%, *n* = 356), however, reported that it was "never" okay for other mothers, family members, or friends to shake a baby.

Table 10

The Incidence and Likelihood of Infant Shaking

Item	Response							
	Never		Sometimes		95% CI*	Often		95% CI*
	n	%	*n*	%		*n*	%	
1. Is it okay for others to shake?	356	92.4 %	28	7.3 %	[5.0, 10.0]	1	0.3 %	[0.0, 1.0]
2. Have shaken infant	334	86.8 %	47	12.2 %	[9.0, 16.0]	4	1.0 %	[0.0, 1.0]
3. Might shake if angry or upset	320	83.1 %	61	15.9 %	[12.0, 19.0]	4	1.0 %	[0.0, 2.0]
4. Would shake as a last resort	317	82.3 %	67	17.4 %	[14.0, 21.0]	1	0.3 %	[0.0, 1.0]
5. Might shake if overwhelmed	314	81.6 %	66	17.1 %	[14.0, 21.0]	5	1.3 %	[0.0, 3.0]
6. Wanted to shake infant	308	80.0 %	72	18.7 %	[15.0, 23.0]	5	1.3 %	[0.0, 3.0]

Note. * The 95% confidence interval (CI) is a bootstrapped calculation of the percentages using 1,000 re-samples.

Given that this study has identified two independent groups of participants (i.e., participants who self-reported shaking vs. not shaking their infant), the groups were compared in terms of the risk factors for child maltreatment; descriptive statistics included frequencies, the mean, standard deviation, median, and the range.

Table 11

Formula for Cohen's d and Hedge's g

Cohen's d	Hedge's g
$\frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1 - 1)SD_1^2 + (n_2 - 1)SD_2^2}{n_1 + n_2 - 2}}}$	$Cohen's\ d\ \times \left(1 - \frac{3}{4(n_1 + n_2) - 9}\right)$

Cohen's *d* and Hedge's *g* (the latter a correction formula) were also calculated to assess measures of effect size for the between group differences. Because Cohen's *d* is thought to be an upwardly biased estimator of effect size, Hedge's *g* was used to compare the findings between the two measures (Field, 2009). Cohen's *d* was calculated by weighting the standard deviation according to sample size; this method is thought to be more accurate than the standard calculation that does not take into account the pooled variance.

Table 12

Between Group Differences for the Risk Factors for Child Maltreatment

Variable	Group							
	Did not shake (*n* = 334)				Did shake (*n* = 51)			
	M	Std. dev	Median	Range	M	Std. dev	Median	Range
1. Infant age (days)	166.92	102.81	154.50	7 – 373	216.84	105.18	233.00	15 – 361
2. Social support	49.96	7.15	52.00	23 – 57	45.94	6.70	44.00	36 – 57
3. Caregiver age (years)	27.59	7.67	26.00	18 – 60	25.59	6.28	24.00	18 – 41
4. Caregiver response to infant crying	11.22	3.24	12.00	6 – 18	12.16	2.55	13.0	6 – 16
5. Knowledge of shaking	10.91	1.56	12.00	4 – 12	8.84	2.38	10.00	4 – 12
6. Postnatal depression	8.39	5.14	8.00	0 – 26	9.86	5.41	10.00	0 – 24
7. Exposure to community violence	6.45	5.12	5.50	0 – 23	7.49	6.11	6.00	0 – 26
8. Caregiver history of childhood abuse	2.81	2.88	2.00	0 – 18	3.86	3.48	3.00	0 – 16
9. Alcohol use	1.94	4.02	0.00	0 – 24	3.69	7.57	0.00	0 – 33
10. Intimate partner violence	1.23	2.27	0.00	0 – 12	2.08	2.72	1.00	0 – 12
11. Poverty (i.e., household hunger)	0.84	1.10	0.00	0 – 5	0.96	1.23	0.00	0 – 5
12. Thoughts of shaking	0.35	1.06	0.00	0 – 7	3.49	1.49	4.00	0 – 6
13. Unemployed	74 % (*n* = 246)	-	-	-	80 % (*n* = 41)	-	-	-
14. Inconsolable infant crying	31 % (*n* = 104)	-	-	-	47 % (*n* = 24)	-	-	-
15. Infant gender (Male)	50 % (*n* = 166)	-	-	-	63 % (*n* = 32)	-	-	-
16. In a relationship	93 % (*n* = 312)	-	-	-	90 % (*n* = 46)	-	-	-

Note. M = The mean.

Between-groups comparisons. The descriptive statistics comparing the two independent groups (i.e., self-reported shaking vs. not shaking) in terms of the risk factors for child maltreatment are presented in Table 12. Given that the outcomes for both Cohen's *d* and Hedge's *g* were the same, and because Cohen's *d* is more commonly reported in psychological research, the latter is reported here.

The results show that shaken infants were older than infants that were not shaken (*d* = - 4.916). Women who reported shaking were also younger on average (*d* = - 0.73), were more likely to have children that cried inconsolably, and were exposed to more risk factors for child maltreatment, including: alcohol use (*d* = - 0.83), postnatal depression (*d* = - 0.65), history of childhood abuse (*d* = - 0.61), intimate partner violence (*d* = - 0.56), community violence *(d* = - 0.45) and poverty (*d* = - 0.11). Participants who reported shaking also had more thoughts of shaking (*d* = -2.97), knew less about the dangers of shaking (*d* = 1.60), had lower social support (*d* = 1.51), and did not respond well to infant crying (*d* = - 0.53).

Whether the group differences were significant was not examined, because the risk of making a Type I error (incorrectly rejecting a true null hypothesis) was large. To demonstrate this, if a Mann-Whitney U test was performed (the nonparametric equivalent of an independent samples *t*-test) on the 12 numeric independent variables of interest, there would be a 46% chance of observing at least one significant result, even if all of the tests were not significant (i.e., formula: $1 - (1 - .05)^{12} = .46$). Similarly, a Bonferroni correction was not used to deal with this issue of multiple testing because the Bonferroni method can be too conservative and therefore increase the risk for Type II errors (incorrectly retaining a false null hypothesis; Field, 2009).

Table 13

Triggers from Confirmed Cases of Infant Shaking (N = 51)

Trigger	*n*	%	Examples
Inconsolable infant crying	39	76.5	• "Sometimes when she is crying, I just check everything, nappy[7], and I became so angry that I want to cry also because I don't know what she is crying for." • "I shake my baby sometimes when I'm angry with him because of the crying. He likes to cry a lot so I become angry [pause] and shake him because I want him to stop."
Angry	27	53.0	• " When I'm cross, nê, when I'm frustrated or angry, then I take it out on my child…" • "Sometimes my baby can cry non-stop and that thing is making me angry…"
Did not know why infant was crying	18	35.3	• " Just when he's crying non-stop, so I don't know what to do next…" • "That time I was depressed because I had an argument with the father. So I came home and baby was crying, and I just didn't know what to do…"
Worried or stressed	12	23.5	• "Sometimes when I'm stressing about something and my baby is crying all the time, I become angry and shake her because I don't know what she wants at that time." • "I shake my baby when he is crying non-stop. Sometimes I'm stressing about something and I just shake him so that he can stop."

[7] Diaper.

Table 13 cont.

Trigger	*n*	%	Examples
Frustrated	11	21.5	• "Most of the time when I feel frustrated or angry I give baby to the father or go for a walk so I can cool down. Sometimes I just pray, please God just keep me calm. I need to calm down. Yesterday, baby didn't want to sit down. Feeling frustrated because I was busy and she didn't want to sit, 'Why don't you want to sit!'. Then I shake her."
Tried all other methods to calm infant	10	19.6	• "Sometimes when she is crying, I just check everything, nappy, and I became so angry that I want to cry also because I don't know what is she crying for. That's when I shake her and ask shouting at her what do you want!" • " I shake my baby when I'm angry at him, because there are times when he can cry without stopping and I have done everything that I needed to do but he will keep on crying."
Tired	5	9.8	• "I feel like tired, nothing else, I'm just tired of doing this now…" • "It happened at night and I didn't get a lot of sleep. I shook baby on the bed by her arm and told her to stop crying and go to sleep. Picked baby up afterwards."
Emotionally absent	2	4.0	• "It's like when you shake a baby you are angry, it's like you don't know that you are hurting a baby, it's not good. I don't feel anything, I just do it, when I try everything and nothing work."
Overwhelmed	2	4.0	• "I was overwhelmed because he was crying and crying, ja."

Note. Two participant responses were missing.

Aim 2: Triggers of Shaking

In the interview, participants were asked to describe – and demonstrate with a lifelike infant doll – the event of shaking their baby. The findings from a content analysis are reported in Table 13 and document the triggers of confirmed shaking (*n* = 51; 13.2%; see Appendix J for all shaking responses).

Inconsolable infant crying was the most frequently reported trigger, and more than half of the participants felt angry before shaking their baby. A third of participants reported that they did not know why their baby was crying, whilst some women felt tired or overwhelmed before shaking their baby.

The subjective experiences of shaking. Two themes emerged following a thematic analysis of participants' responses, giving further meaning to the experiences of shaking.

Shaken babies: a momentary loss of control. From the responses, shaking was often portrayed as a moment when the participant lost control during heightened or flattened emotion (most often in response to inconsolable infant crying). Three participant responses are provided and thereafter discussed.

Participant 69: "I shake my baby when I'm angry at him, because there are times when he can cry without stopping and I have done everything that I needed to do but he will keep on crying. That's when I shake him, especially at nights he likes to cry while I want to sleep*."*
(Male infant: 9 months old)

Participant 125: "I shake my baby when I'm upset just to make her stop crying. Sometimes I have fed her, bath her, and even play with her but she will keep on crying… that's when I become angry on her.*"*
(Female infant: 8 months old)

Participant 263: "Now he was just crying 'cause he was teething and had injection. I gave him bottle, fed him, bathed him, changed diaper, did everything, now thinking of what to do. [Mother imitates shaking her child while the infant sits on her lap. She holds the baby by the shoulders and imitates shaking the infant] "Stoooop… don't cry" [Mother grits teeth]. Just frustrated cause I don't know what to do and I've done everything I'm supposed to do."
(Male infant: 11 months old)

From the three examples provided, a similar sequence of events occurred. First, the infant cried and the participant attempted to console the baby by attending to the child's needs (e.g., the participant fed or bathed the infant, played with the child etc.). Despite these efforts, the infant continued to cry and this situation seemed to provoke feelings of heightened emotion (e.g., the participant felt angry). In this state, the participant resorted to shaking in a final attempt to stop the child from crying.

The above events describe how participants seemed to experience an interplay between a loss of physical control (i.e., the participant could not stop the child from crying), as well as a loss of emotional control (i.e., participants often lost their temper), leading up to, and during, the event of shaking.

In asking the participants to describe their experiences of shaking their babies, participants were given the opportunity to reflect upon the event. Three examples are provided and subsequently discussed.

Participant 1: "When I shaked him, he was looking straight in my eyes, thinking what is my mom doing? Then I felt bad and tried to hug him because he won't stop crying…" *(Male infant: 9 months old)*

Participant 9: "… I was overwhelmed because he was crying and crying… Ja, but it's not good to shake the baby, he didn't like to be shaked…"
(*Male infant: 5 months old*)

Participant 179: "…But I'm thinking I mustn't do that, it's wrong, it's not his problem. Afterwards, thinking it's not right, can't do it with him."
(*Male infant: 10 months old*)

In the process of reflection, it appears that participants were able to think more rationally about their behaviour. For example, Participant 1 felt guilty after shaking her baby, and both Participants 9 and 179 recognised that it was not good to shake a baby. These findings suggest that while some participants might have intrinsically known better than to shake their infant, this did not prevent them from shaking their children during times of heightened emotion and/or stress. Adding to these reflections, certain risk factors were identified from the women's narratives, giving insight into how their experiences of stress might have increased the potential for shaking. For example:

Participant 1: "… Before that [shaking the child], I was worried about what is this child going to eat. My husband is the only one working. He was crying, I gave him breast milk, won't stop crying, there wasn't money for pumpkin. Crying was frustrating me. Felt very bad, because that is the baby. Baby can't provide, as a mom you should be able to provide."
(*Male infant: 9 months old*)

Clearly, this participant could not afford even basic food for her child, and it can reasonably be expected that household hunger may have been a normative occurrence in this family. To support this claim, the data were cross-checked and it was confirmed that the participant received the Child Support Grant of R380 per month – meaning that the family lived below the food poverty line (the most severe national line), indicating extreme poverty (Hall & Budlender, 2016). From this example, it seems that poverty and unemployment contributed towards shaking by exacerbating the participant's inability to cope with cumulative stress, i.e., inconsolable infant crying and the pressure to provide food for the child, despite a lack of financial resources. In the extracts that follow, community violence and postnatal depression are identified as risk factors for shaking.

Participant 277: "When she was starting to cry (at night I came home late with her), can't walk around community, it's not safe. Crying, crying, crying, left her, rather ask why. Said I don't know why she's crying, put stuff on her teeth… [Mother imitates shaking her child]. I was cross when I shaked her..."
(*Female infant: 9 months old*)

Participant 282: "That time I was depressed because I had an argument with the father, so I came home and baby was crying, and I just didn't know what to do…"
(*Male infant: 5 months old*)

From the first response (Participant 277), it seems that the participant lived in an area that was not safe – this is not surprising given that the study was located in previously disadvantaged communities where violence was expected to be high. This also means that the average sample score for the exposure to community violence (M = 6.59) likely represents moderate to high levels of community violence. The participant's score of 7 is only

somewhat higher than the sample average, although still warrants legitimate concerns of community safety which may have contributed to the event of shaking.

In the second response, Participant 282 scored 13 on the Edinburgh Postnatal Depression Scale; while the participant did not expand on her feelings of depression, this score indicated probable depression and is significantly higher than the sample average (M = 8.58). Together, these findings identify community violence and postnatal depression as two independent risk factors which adversely impacted upon the ways in which some women responded to inconsolable infant crying (and potentially increased the risk for shaking).

***Caring alone: isolation and infant shaking*.** The implicit evidence in the women's narratives formed the basis of this theme. To be specific, the participants seldom reported having someone else to care for their infant, particularly during the women's time of need, e.g., when a participant felt angry, stressed, or provoked by their infant's cry. Most often, participants used the word "I" to construct their identity as the "sole caregiver" in the moments leading up to, and during the event of shaking. Three extracts are provided:

Participant 6: "I would shake her and she would look at me with big eyes and she would cry on. She would cry louder, scream sometimes. I was feeling frustrated cause I'm tired sitting up in the night."
(*Female infant: 8 months old*)

Participant 263: "Stooop… don't cry" [Mother grits teeth]. Just frustrated cause I don't know what to do and I've done everything I'm supposed to do."
(*Male infant: 11 months old*)

Participant 278: "I feel tired, nothing else. I'm just tired of doing this now. Feeling frustrated."
(*Female infant: 11 months old*)

The implicit message in these responses is that participants felt that they alone were responsible for their children. The image portrayed by Participant 6 is of an overwhelmed, tired mother, sitting alone trying to console her infant in the middle of the night. Similarly, Participant 263 appeared to be at a loss of what to do, because despite her best efforts, she could not console her child. These participants were single mothers with no partners, indicating that the burden of childcare fell solely on their shoulders. Although Participant

278 was in a relationship (albeit that her partner did not live with her), this mother seemed despondent in terms of her capabilities to continue caring for her child.

The suggestion that women often felt alone in caring for their children is further reflected in that only one participant (2%) reported having a partner to help her when she struggled to cope when her child cried. Although it was not explicitly asked if participants had a partner who could help them during a time of need (like inconsolable infant crying), 90% (n = 46) of women who admitted to shaking were in a relationship. From this perspective, it seems reasonable to expect that if partners were a source of support, they would have been mentioned in the women's narratives.

Adding to the discussion thus far, the three participants (as previously described) reported having lower social support (according to scores on the Medical Outcomes Study Social Support Scale; range: 42 to 45) compared to the overall sample (M = 49.4). This was despite the fact that these participants lived in households with other adults (range: 1 to 3 additional adults). Taken together, these findings suggest that women may have felt that they alone were responsible for their children, and that although some participants lived with other adults, this did not necessarily translate into having more support.

Aim 3, Part 1: The Predictors of Shaking

The correlation matrix for the predictors of shaking is presented in Table 14.

Table 14

Correlations Between Potential Predictors and Shaking

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1. Infant age	1.00	-.01	.07	-.09	-.02	.05	.07	.01	.07	.10	.06	.18†	.03	.02	.00	-.09	.16*
2. Social support		1.00	-.02	-.33†	.26†	-.31†	-.10	-.16*	-.14*	-.28†	-.26†	-.24†	.06	-.02	-.03	.15*	-.19†
3. Caregiver age			1.00	.00	.10$^{\Delta}$	-.07	-.03	-.05	-.12$^{\Delta}$	-.12$^{\Delta}$	.09	-.14*	.11$^{\Delta}$	-.04	.05	.04	-.09
4. Responses to crying				1.00	-.30†	.07	-.02	-.08	-.04	.10	.14*	.17†	-.02	-.09	.08	-.01	.10$^{\Delta}$
5. Knowledge of shaking					1.00	.06	.10$^{\Delta}$	.09	.05	-.03	-.08	-.47†	-.01	-.07	.01	-.02	-.38†
6. Postnatal depression						1.00	.31†	.43†	.25†	.48†	.29†	.17†	-.03	.16*	.02	-.11$^{\Delta}$	.10
7. Community violence							1.00	.45†	.27†	.45†	.21†	.09†	.04	-.02	-.08	-.07	.07
8. History childhood abuse								1.00	.32†	.43†	.17	.17†	.01	.08	-.04	-.11$^{\Delta}$	.12$^{\Delta}$
9. Alcohol use									1.00	.40†	.15*	.13$^{\Delta}$	-.05	-.01	.03	-.02	.13$^{\Delta}$
10. Intimate partner violence										1.00	.29†	.18†	-.04	.06	-.05	-.18†	.12$^{\Delta}$
11. Poverty											1.00	.15*	-.03	.10	-.01	-.13*	.04
12. Thoughts of shaking												1.00	-.01	.09	-.04	-.03	.69†
13. Employment status													1.00	-.02	-.02	.07	-.05
14. Inconsolable crying														1.00	-.10$^{\Delta}$	-.02	.11$^{\Delta}$
15. Infant gender															1.00	.04	-.09
16. Relationship status																1.00	-.04
17. Shaking outcome																	1.00

Note. Δ $p < .05$,* $p < .01$, † $p < .001$

From the correlation matrix, there are moderate correlations between intimate partner violence and postnatal depression, community violence, caregiver history of childhood abuse, and alcohol use (range: r = .40 to .48). Caregiver history of abuse was also correlated with postnatal depression and community violence (range: r = .43 to .45). To reduce the likelihood of multicollinearity, intimate partner violence was excluded as a predictor in all regression analyses because it resulted in some of the highest correlations.

Table 15

Fit Statistics for the Five Models Tested to Predict Shaking

			Change statistics		
Model	AIC	Residual deviance	Model Chi-Square	df	*p*
1	296.62	286.62	14.48	4	.005
2	294.72	280.72	5.90	5	.052
3	279.72	267.72	18.90	1	< .001
4	244.43	226.43	41.29	3	< .001
5	168.53	148.53	77.90	1	< .001

1. Predictors: Poverty, Community violence, Social support, Employment status
2. Predictors: Social support, Caregiver history of childhood abuse, Relationship status, Caregiver age, Alcohol use, Postnatal depression
3. Predictors: Social support, Caregiver age, Alcohol use, Infant gender, Infant age.
4. Predictors: Social support, Caregiver age, Alcohol use, Infant gender, Infant age, Knowledge of shaking, Caregiver response to infant crying, Inconsolable infant crying
5. Predictors: Social support, Caregiver age, Alcohol use, Infant gender, Infant age, Knowledge of shaking, Caregiver response to infant crying, Inconsolable infant crying, Thoughts of shaking

From the fit statistics, a five-step hierarchical logistic regression analysis was conducted with 15 predictors for shaking (see Table 3 as a reminder of the order of predictors). Although the power analysis indicated a maximum of 14 predictors for this study, non-significant predictors were removed after step of analysis which meant that I could examine all 15 predictors (because the model never contained all predictors at one time).

In model 1, lack of social support ($p < .001$) significantly predicted shaking, $p = .005$. Model 2, however, was not significant, $p = .052$ (six non-significant predictors were removed: poverty, community violence, employment status, caregiver history of childhood abuse, relationship status, and postnatal depression). Following this, model 3 significantly improved the ability to predict shaking from model 1, $p = < .001$; together, lack of social support ($p = < .001$), infant gender (male; $p = .049$), and older infant age ($p = .002$) predicted shaking (a young caregiver age neared significance, $p = .053$).

Model 4 was significantly better than model 3, $p < .001$; alcohol use ($p = .025$), infant age ($p = .002$), knowledge of shaking ($p = < .001$), and inconsolable infant crying ($p = .043$), predicted shaking. Lack of social support and infant gender (male) were no longer significant (but neared significance, $p < .08$). Model 5 (the final model) was significantly better than model 4, $p < .001$, and thoughts of shaking ($p < .001$) was the only predictor of shaking. The findings from both models 4 and 5 are, however, reported because it seems reasonable to expect that a participant might very well shake a child if she reported having thoughts of shaking (model 4, therefore, indicates the more distal risk factors for shaking).

Table 16

Model 4: Predictors of Shaking

	Coefficients		95% CI for Odds Ratio			
	B	SE	Odds Ratio	Lower Bound	Upper Bound	*p*
Constant	3.86	2.02				.056
Social support	- 0.05	0.03	0.96	0.91	1.01	.077
Caregiver age	- 0.04	0.03	0.96	0.91	1.01	.168
Alcohol use	0.07	0.03	1.07	1.01	1.13	.025
Infant gender (Male)	0.64	0.36	1.89	0.95	3.89	.074
Infant age	0.01	0.00	1.01	1.00	1.01	.002
Knowledge of shaking	- 0.47	0.09	0.63	0.53	0.74	< .001
Responses to crying	0.02	0.07	1.02	0.89	1.17	.761
Inconsolable infant crying (Yes)	0.72	0.35	2.05	1.02	4.12	.043

Note. CI = confidence interval. $R^2 = .25$ (McFadden). Model $\chi^2(8) = 74.68$, $p < .001$

Model 4. In this model, alcohol use, infant age, knowledge of shaking, and inconsolable infant crying significantly predicted shaking, and a lack of social support and infant gender (male) neared significance. Overall, the model explained 25% (McFadden's Pseudo R^2) of the variance in shaking, and correctly classified 87.5% of cases [95% CI: 83.8, 90.7]. The overall model accuracy from the 10–fold validation set was 87%, confirming the accuracy of the original predictions. Caution is, however, warranted as to the overall model accuracy because there is a large discrepancy between the sensitivity (31.4%) and specificity (96.1%) values – this means that the model is quite accurate in predicting the true negative rate (the likelihood that an infant will not be shaken), but does not predict the true positive rate well (the likelihood that an infant will be shaken). In addition, the negative predictive value was 90.2% (the percentage of correctly predicted cases of "not shaken" compared to the total number of predicted "not shaken" cases), and the positive predictive value was 55.2% (the percentage of correctly predicted cases of "shaken" compared to the total number of predicted "shaken" cases).

This model shows that as alcohol use (partial odds ratio: 1.07), infant age (partial odds ratio: 1.01), and inconsolable infant crying (partial odds ratio: 2.05) increased, infants were more likely to be shaken. As knowledge of shaking increased, the odds of shaking decreased by a factor of 1.35.

The confidence intervals for the odds ratios suggest that the relationship between each of the four significant predictors and shaking might be true of the larger population. This is because when the confidence interval limits are restricted to a range that is either below 1 or above 1, this indicates a stable negative or a stable positive relationship. When confidence interval limits cross 1 (i.e., are less than 1 and greater than 1), this reflects an unstable relationship and findings are not as generalizable (Field, 2009).

Table 17

Model 5: Predictors of Shaking

	Coefficients		95% CI for Odds Ratio			
	B	SE	Odds Ratio	Lower Bound	Upper Bound	*p*
Constant	- 2.08	2.62				.425
Social support	- 0.01	0.03				.685
Caregiver age	0.01	0.03	1.01	0.94	1.07	.877
Alcohol use	0.05	0.03	1.05	0.98	1.13	.163
Infant gender (Male)	0.79	0.46	2.20	0.91	5.57	.085
Infant age	0.00	0.00	1.00	1.00	1.01	.334
Knowledge of shaking	- 0.18	0.10	0.83	0.68	1.01	.064
Responses to crying	- 0.04	0.10	0.96	0.80	1.15	.663
Inconsolable infant crying (Yes)	0.67	0.44	1.96	0.83	4.74	.128
Thoughts of shaking	1.01	0.14	2.74	2.12	3.69	< .001

Note. CI = confidence interval. R^2 = .51 (McFadden). Model $\chi^2(9) = 152.58$, $p < .001$

Model 5. This model shows that thoughts of shaking is the single most important predictor of shaking, and explains 51% of the variance overall, $\chi^2(9) = 152.58$, $p < .001$. Infant gender (male) and knowledge of the dangers of shaking neared significance. The model correctly classified 92.7% of cases [95% CI: 89.7, 95.1] – a similar estimate to the overall accuracy from the 10–fold validation set method (90.6%). The discrepancy between the sensitivity (78.4%) and the specificity (95.0%) values is also a lot smaller, indicating that the overall model accuracy in this model is more balanced. This is further reflected by the smaller discrepancy between the negative predictive value (96.7%) and the positive predictive value (70.2%). Overall, the findings show that as thoughts of shaking increased by one unit, the odds of shaking an infant increased by a factor of 2.74 (the 95% CI limits do not overlap [2.12, 3.69], indicating that the relationship was also more or less stable).

Aim 3, Part 2: The Predictors of Thoughts of Shaking

Because this research applied a logarithmic transformation to transform the dependent variable (thoughts of shaking), a new correlation matrix had to be created to examine the relationship between the predictors and thoughts of shaking (see Table 18).

Table 18

Correlations Between Potential Predictors and the Log-Transformed Dependent Variable, Thoughts of Shaking

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1. Infant age	1.00	-.01	.07	-.09	-.02	.05	.07	.01	.07	.10	.06	.19†	.03	.02	.00	-.09	.16*
2. Social support		1.00	-.02	-.33†	.26†	-.31†	-.10	-.16*	-.14*	-.28†	-.26†	-.22†	.06	-.02	-.03	.15*	-.19†
3. Caregiver age			1.00	.00	.10$^{\Delta}$	-.07	-.03	-.05	-.12$^{\Delta}$	-.12$^{\Delta}$	.09	-.14*	.11$^{\Delta}$	-.04	.05	.04	-.09
4. Responses to crying				1.00	-.30†	.07	-.02	-.08	-.04	.10	.14*	.19†	-.02	-.09	.08	-.01	.10$^{\Delta}$
5. Knowledge of shaking					1.00	.06	.10$^{\Delta}$	.09	.05	-.03	-.08	-.50†	-.01	-.07	.01	-.02	-.38†
6. Postnatal depression						1.00	.31†	.43†	.25†	.48†	.29†	.14*	-.03	.16$^{\Delta}$	.02	-.11$^{\Delta}$	.10
7. Community violence							1.00	.45†	.27†	.45†	.21†	.04	.04	-.02	-.08	-.07	.07
8. History childhood abuse								1.00	.32†	.43†	.17*	.15*	.01	.08	-.04	-.11$^{\Delta}$	.12$^{\Delta}$
9. Alcohol use									1.00	.40†	.15*	.14*	-.05	-.01	.03	-.02	.13$^{\Delta}$
10. Intimate partner violence										1.00	.29†	.15*	-.04	.06	-.05	-.18†	.12$^{\Delta}$
11. Poverty											1.00	.13*	-.03	.10	-.01	-.13*	.04†
12. Thoughts of shaking												1.00	.02	.10	-.02	-.05	.64
13. Employment status													1.00	-.02	-.02	.07	-.05$^{\Delta}$
14. Inconsolable crying														1.00	-.10$^{\Delta}$	-.02	.11
15. Infant gender															1.00	.04	-.09
16. Relationship status																1.00	-.04
17. Shaking outcome																	1.00

Note. Δ $p < .05$,*$p < .01$, † $p < .001$

Table 19

Fit Statistics for the Four Models Tested to Predict Thoughts of Shaking

			Change statistics		
Model	AIC	Residual deviance	Model Chi-Square	df	*p*
1	398.78	388.78	20.21	4	< .001
2	390.43	374.43	14.35	3	.002
3	377.14	359.14	15.28	1	< .001
4	288.00	268.00	91.14	1	< .001

1. Predictors: Poverty, Community violence, Social support, Employment status
2. Predictors: Poverty, Social support, Caregiver history of childhood abuse, Relationship status, Caregiver age, Alcohol use, Postnatal depression
3. Predictors: Poverty, Social support, Caregiver history of childhood abuse, Relationship status, Caregiver age, Alcohol use, Infant gender, Infant age
4. Predictors: Poverty, Social support, Caregiver history of childhood abuse, Caregiver age, Alcohol use, Infant age, Knowledge of shaking, Caregiver response to infant crying, Inconsolable infant crying

From the fit statistics**,** a four-step hierarchical logistic regression analysis was conducted with 14 potential predictors. In model 1, lack of social support ($p < .001$) significantly predicted thoughts of shaking. Model 2 significantly improved the ability to predict thoughts of shaking from model 1, $p = .002$; lack of social support ($p < .001$) and young caregiver age ($p = .007$) predicted thoughts of shaking. Following this, model 3 was significantly better than model 2, $p < .001$; lack of social support ($p < .001$), caregiver age ($p = .003$), and infant age ($p < .001$) predicted thoughts of shaking. Model 4 (the final model) was significantly better than model 3, $\chi^2(1) = 91.14$, $p < .001$; caregiver history of previous childhood abuse ($p < .001$), young caregiver age ($p = .025$), infant age ($p < .001$), knowledge of shaking ($p < .001$), and less favourable responses to infant crying ($p = .044$) explained 34% of the variance in thoughts of shaking.

Table 20

Model 4: Predictors of Thoughts of Shaking

	Coefficients		95% CI for Odds Ratio			
	B	SE	Odds Ratio	Lower Bound	Upper Bound	*p*
Constant	4.35	1.91				.022
Poverty	0.09	0.14	1.09	0.82	1.44	.538
Social support	- 0.02	0.02	0.98	0.94	1.03	.423
History of childhood abuse	0.18	0.05	1.20	1.08	1.33	< .001
Caregiver age	- 0.05	0.02	0.95	0.90	0.99	.025
Alcohol use	0.05	0.03	1.05	0.99	1.12	.126
Infant age	0.01	0.00	1.01	1.00	1.01	< .001
Knowledge of shaking	- 0.69	0.10	0.50	0.41	0.60	< .001
Responses to crying	0.13	0.06	1.14	1.01	1.30	.044
Inconsolable infant crying (Yes)	0.50	0.32	1.65	0.87	3.11	.122

Note. CI = confidence interval. R^2 = .34 (McFadden). Model $\chi^2(9) = 140.98$, $p < .001$

The model and the 10-fold validation set correctly classified 84.5% of cases [95% CI: 79.8, 87.4]. There was, however, a fairly large difference between the sensitivity (54.7%) and specificity (92.3%) values. The negative and positive predictive values were 87.6% and 67.1%, respectively.

In conclusion, as history of childhood abuse (partial odds ratio: 1.33), infant age (partial odds ratio: 1.01), and caregiver responses to crying (partial odds ratio: 1.30) increased by one unit; and as caregiver age decreased; the odds of having thoughts of shaking increased (an increase in history of childhood abuse and caregiver responses to crying indicated worse outcomes). As knowledge of shaking increased, the odds of having thoughts of shaking decreased by a factor of 1.67. For each of the five significant predictors, the 95% confidence interval limits indicated a stable relationship.

Aim 4: The Predictors of Knowledge of Shaking

In this aim, a logarithmic transformation was also applied to the dependent variable (knowledge of shaking) – the relationships between the predictors and knowledge of shaking were examined using a new correlation matrix (see Table 21).

Table 21

Correlations Between Potential Predictors and the Log-Transformed Dependent Variable, Knowledge of the Dangers of Shaking

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1. Infant age	1.00	-.01	.07	-.09	-.02	.05	.07	.01	.07	.10	.06	.19†	.03	.02	.00	-.09	.16*
2. Social support		1.00	-.02	-.33†	.19†	-.31†	-.10	-.16*	-.14*	-.28†	-.26†	-.22†	.06	-.02	-.03	.15*	-.19†
3. Caregiver age			1.00	.00	.08	-.07	-.03	-.05	-.12$^{\Delta}$	-.12$^{\Delta}$	.09	-.14*	.11$^{\Delta}$	-.04	.05	.04	-.09
4. Responses to crying				1.00	.18†	.07	-.02	-.08	-.04	.10	.14*	.19†	-.02	-.09	.08	-.01	.10$^{\Delta}$
5. Knowledge of shaking					1.00	.10	.12$^{\Delta}$	.13*	.07	.03	-.06	-.39†	-.07	-.10	.04	.01	-.32†
6. Postnatal depression						1.00	.31†	.43†	.25†	.48†	.29†	.17†	-.03	.16*	.02	-.11$^{\Delta}$	.10
7. Community violence							1.00	.45†	.27†	.45†	.21†	.09†	.04	-.02	-.08	-.07	.07
8. History childhood abuse								1.00	.32†	.43†	.17*	.17†	.01	.08	-.04	-.11$^{\Delta}$	.12$^{\Delta}$
9. Alcohol use									1.00	.40†	.15*	.13$^{\Delta}$	-.05	-.01	.03	-.02	.13$^{\Delta}$
10. Intimate partner violence										1.00	.29†	.18†	-.04	.06	-.05	-.18†	.12$^{\Delta}$
11. Poverty											1.00	.15*	-.03	.10	-.01	-.13*	.04
12. Thoughts of shaking												1.00	-.01	.09	-.04	-.03	.69†
13. Employment status													1.00	-.02	-.02	.07	-.05
14. Inconsolable crying														1.00	-.10$^{\Delta}$	-.02	.11$^{\Delta}$
15. Infant gender															1.00	.04	-.09
16. Relationship status																1.00	-.04
17. Shaking outcome																	1.00

Note. Δ $p < .05$,*$p < .01$, † $p < .001$

Table 22

Fit Statistics for the Four Models Tested to Predict Knowledge of the Dangers of Shaking

			Change statistics		
Model	AIC	Residual deviance	Model Chi-Square	df	*p*
1	288.65	278.65	22.46	4	< .001
2	282.11	266.11	12.54	3	.006
3	284.41	264.41	1.69	2	.427
4	275.56	255.56	10.55	2	.005

1. Predictors: Poverty, Community violence, Social support, Employment status
2. Predictors: Community violence, Social support, Caregiver history of childhood abuse, Relationship status, Caregiver age, Alcohol use, Postnatal depression
3. Predictors: Community violence, Social support, Caregiver history of childhood abuse, Relationship status, Caregiver age, Alcohol use, Postnatal depression, Infant gender, Infant age
4. Predictors: Community violence, Social support, Caregiver history of childhood abuse, Relationship status, Caregiver age, Alcohol use, Postnatal depression, Caregiver response to crying, Inconsolable infant crying

From the fit statistics table, a four-step hierarchical logistic regression analysis was conducted with 13 predictors. In model 1, community violence ($p = .007$) and lack of social support ($p < .001$) predicted knowledge of shaking, $p < .001$. Model 2 significantly improved the ability to predict knowledge of shaking from model 1, $p = .005$; lack of social support ($p < .001$) and older caregiver age ($p = .038$) – caregiver history of previous childhood abuse neared significance ($p = .093$). Model 3 was not significantly better than model 2, $p = .427$. Following this, infant gender and infant age were removed; overall model 4 was the best model predicting knowledge of shaking, $\chi^2(9) = 45.54$, $p = < .001$. All things considered, the predictors explained 15% of the variance in knowledge of shaking, these were: lack of social support ($p < .001$), older caregiver age ($p = .044$), postnatal depression ($p = .025$), caregiver responses to infant crying ($p = .022$), and inconsolable infant crying ($p = .017$).

Table 23

Model 4: Predictors of Knowledge of the Dangers of Shaking

	Coefficients		95% CI for Odds Ratio			
	B	SE	Odds Ratio	Lower Bound	Upper Bound	*p*
Constant	- 2.38	1.79				.183
Community violence	0.02	0.04	1.02	0.95	1.10	.592
Social support	0.08	0.02	1.08	1.03	1.13	< .001
Caregiver history of abuse	0.13	0.08	1.13	0.97	1.34	.124
Relationship status (Single)	- 0.10	0.62	0.90	0.29	3.52	.867
Caregiver age	0.05	0.03	1.05	1.00	1.11	.044
Alcohol use	0.02	0.05	1.02	0.94	1.13	.605
Postnatal depression	0.09	0.04	1.09	1.01	1.18	.025
Response to crying	- 0.14	0.06	0.87	0.76	0.98	.022
Inconsolable infant crying (Yes)	- 0.80	0.34	0.45	0.23	0.87	.017

Note. CI = confidence interval. $R^2 = .15$ (McFadden). Model $\chi^2(9) = 45.55$, $p < .001$

The model correctly classified 87.8% of cases [95% CI: 84.1, 90.9], and this was confirmed by the 10–fold validation set method. There was, however, a large discrepancy between the sensitivity (99.4%) and specificity values (11.7%), meaning that one should interpret the overall model accuracy with caution.

Findings from the model showed that as social support (partial odds ratio: 1.08), caregiver age (partial odds ratio: 1.05), and postnatal depression (partial odds ratio: 1.09) increased, knowledge of shaking increased – the finding for postnatal depression seems counterintuitive. To explore this further, a scatterplot was used to examine the association. Subsequently, it became apparent that the relationship was not a true finding: the proportion of women with self-reported postnatal depression (48.8%, *n* = 188) was a lot higher than women with a higher knowledge of the dangers of shaking (13.2%, *n* = 51). The association thus appeared to exist because of the many women who reported having postnatal depression.

As knowledge of shaking increased, inconsolable infant crying decreased (partial odds ratio: 2.22), possibly because caregivers responded better to infant crying (partial odds ratio:

1.14; these ratios were inverted for ease of interpretation). The 95% confidence interval limits were stable for the four significant predictors.

Aim 5: Methods to Console Crying Infants

Before reporting the methods that participants used to console their infants, it is worth mentioning an inverse association that was observed. Regarding participants' responses to infant crying, 128 participants (33.3%) reported that their infants had cried inconsolably, although 257 women (66.7%) reported that in general, infant crying had made them feel irritable, angry, upset, or depressed (see Questions 2 and 5 from Appendix G, Section C). From this perspective, crying may provoke feelings that could lead to shaking, and the relative risk is presumed to be even higher for children who cry continuously.

To identify the indigenous methods that participants used to console their children, a content analysis was conducted. Given that infant crying can be distressing to caregivers, this aim recognises the similarities and differences between the two groups (i.e., shaking vs. not shaking) in terms of the methods used to console children.

The qualitative questions from the Responses to Infant Crying Scale (see Appendix G, Section C) formed the basis of these results. Some questions were not applicable to all women, and for this reason, the number of participants for each question varies. For example, if a woman had not yet experienced inconsolable infant crying, she could not be asked how she responded to inconsolable infant crying.

Table 24

Indigenous Methods to Console Crying Infants

	When your baby cries, what do you do?				How do you prevent your baby from crying inconsolably?			
	Not Shaken		Shaken		Not Shaken		Shaken	
Response to child	(*n* = 334)	%	(*n* = 51)	%	(*n* = 202)	%	(*n* = 25)	%
Physiological needs								
Breastfeed or give food	291	87.1 %	43	84.3 %	54	26.7 %	11	44.0 %
Comfort infant	133	39.8 %	23	45.1 %	52	25.7 %	2	8.0 %
Change nappy	89	26.6 %	8	15.7 %	55	27.2 %	7	28.0 %
Bath infant	15	4.5 %	3	5.9 %	39	19.3 %	6	24.0 %
Infant is sick or teething	9	2.7 %	2	3.9 %	16	7.9 %	1	4.0 %
Social and emotional needs								
Sing or talk to the infant	59	17.7 %	8	15.7 %	34	16.8 %	3	12.0 %
Play, give toys, watch TV	56	16.8 %	12	23.5 %	40	19.8 %	9	36.0 %
Participant coping response								
Go for a walk with infant	27	8.1 %	4	7.8 %	27	13.4 %	2	8.0 %
Infant was an easy child	12	3.6 %	-	-	59	29.2 %	2	8.0 %
Give the infant to someone	5	1.5 %	2	3.9 %	7	3.5 %	1	4.0 %
Shout, smack, or ignore infant	2	0.6 %	1	2.0 %	-	-	1	4.0 %
Participant does not stress	-	-	-	-	3	1.5 %	-	-
Put infant down, walk away	-	-	-	-	-	-	-	-

Table 24 cont.

	When your baby cries inconsolably, what do you do?				When you are frustrated or upset with your baby's crying, what do you do?			
	Not Shaken		Shaken		Not Shaken		Shaken	
Response to child	(*n* = 94)	%	(*n* = 21)	%	(*n* = 283)	%	(*n* = 42)	%
Physiological needs								
Comfort infant	45	47.9 %	7	33.3 %	71	25.7 %	12	28.6 %
Breastfeed or give food	31	33.0 %	3	14.3 %	55	19.4 %	5	12.0 %
Change nappy	14	14.9 %	6	28.5 %	11	3.9 %	2	4.8 %
Bath infant	8	8.5 %	4	19.0 %	2	0.7 %	1	2.4 %
Infant is sick or teething	3	3.2 %	1	4.8 %	14	4.9 %	2	4.8 %
Social and emotional needs								
Sing or talk to the infant	28	29.8 %	10	47.6 %	40	14.1 %	3	7.1 %
Play, give toys, watch TV	22	23.4 %	4	19.0 %	30	10.6 %	6	14.2 %
Participant coping response								
Go for a walk with infant	35	37.2 %	8	38.1 %	49	17.3 %	7	16.7 %
Give the infant to someone	4	4.3 %	1	4.8 %	107	37.8 %	11	26.2 %
Infant was an easy child	-	-	-	-	10	3.5 %	2	4.8 %
Shout, smack, or ignore infant	-	-	-	-	1	0.4 %	2	4.8 %
Participant does not stress	-	-	-	-	19	6.7 %	2	4.8 %
Put infant down, walk away	-	-	-	-	4	1.4 %	-	-

The methods used to console infants are grouped into three main categories: the infants' physiological needs, the infants' social and emotional needs, and the participants' coping responses. Whether the between-group differences were significant was not assessed, because the risk of making a Type I error would have been too large (there were too many comparisons to do so). In response to the question, "When your baby cries, what do you do to make him or her stop crying?", most participants attended to the infants' physiological needs. In descending order of the number of times participants mentioned them, these were: feeding the child, comforting the child, and changing the infant's nappy. Comforting techniques included women holding the infant against their chest, or by strapping the baby onto their back using a towel (this is a traditional African method used to carry an infant). Other methods included cuddling, or 'sussing'; a local, unofficial Afrikaans word that means to gently bounce the infant while holding the child close.

The second most frequent response to infant crying (in terms of the main categories) was attending to the infants' social and emotional needs. These methods included singing or talking to the infant, and playing with the infant or giving the child toys. The primary difference between the two groups of participants for question 1 was with regards to the participants' coping responses: participants who did not shake their infant reported having easy-going, contented children.

"What do you do that prevents your baby from crying on and on?" – this question reflects the answers from participants who had not experienced inconsolable infant crying. The differences between the two groups for this question were that participants who reported shaking were less likely to comfort their children, and were also four times less likely to report having easy-going, contented children. Participants who did not shake their baby also reported not feeling stressed. In the examples that follow, one participant reported that she didn't feel stressed *because* her baby did not cry much, suggesting that infant crying is a source of stress which may increase the risk for shaking.

Participant 46: "When I'm calm, she's calm. When the house is calm, she's calm." (*Female infant: 3 months old*).

Participant 194: "My baby is not crying all the time, so I'm not stressing or getting angry at her."
(*Female infant: 3 months old*).

Participants were also asked: “When your baby won’t stop crying, what do you do to make him or her stop crying?”. In comparison to the frequency of responses in previous questions, both groups of participants were more likely to go for a walk with their infant in an attempt to console their child’s inconsolable cry.

The last question was: “The last time you felt frustrated or upset when your baby cried, did you do anything different to make him or her stop crying?”. Overall, most participants who did not shake their baby gave the infant to someone else (e.g., a family member or friend). Interestingly, 11 participants (26.2%) who reported shaking said that they too would give their baby to someone else – this finding is, however, contradictory to earlier results where only one participant (2%) actually reported giving her child to her partner during a time of need (see Appendix J; participant 52). In comparison to all other questions, both groups of participants were also less likely to attend to the child’s physiological needs, or social and emotional needs when they were angry or upset.

There were also two noticeable differences between the two groups for this question: (1) participants who reported shaking were more likely to smack or ignore their child when they were angry or upset, and (2) participants who did not shake their child reported putting the infant down to self-soothe and walked away temporarily when angry or upset.

Table 25

Length of Time Participants were Comfortable Leaving an Infant to Self-Soothe

Response	*n*	%
Never	182	47.3 %
Up to 5 minutes	179	46.5 %
Up to 15 minutes	21	5.5 %
Up to 30 minutes	2	0.5 %
More than 30 minutes	1	0.2 %

Adding to this, the results from question 1 of the Shaken Baby Syndrome Awareness Assessment – Short Version are relevant. Nearly half of all participants in this sample reported that it was never okay to leave an infant alone to self-soothe, whilst the other half reported that it was acceptable to leave an infant alone for up to 5 minutes.

Summary of Results

Some infants in South Africa are violently shaken; most often in response to inconsolable crying, although feelings of anger, frustration, and stress are important triggers too. A summary of the factors that predicted shaking, thoughts of shaking, and knowledge of

the dangers of shaking is presented in Table 26. Indigenous methods of consoling babies were also identified and may be useful to respond to inconsolable infant crying, possibly preventing shaking.

Table 26

The Predictors of Shaking, Thoughts of Shaking, and Knowledge of the Dangers of Shaking

Predictors			
Shaking		Thoughts of Shaking	Knowledge of Shaking
Final model	Semi-final model		
Thoughts of shaking	Inconsolable infant crying	Caregiver history of childhood abuse	+ Social support
	+ Infant age	+ Infant age	+ Favourable responses to infant crying
	+ Alcohol use	– Caregiver age	+ Caregiver age
	– Knowledge of shaking	– Knowledge of shaking	– Inconsolable infant crying
		– Favourable responses to infant crying	
* Infant gender (Male)	* Infant gender (Male)		
* – Knowledge of shaking	* – Social support		

Note. + = Higher levels of; – = Lower levels of; * = Predictors that neared significance.

Chapter 4: Discussion

The vigorous, manual shaking of young children by the torso, extremities, or shoulders is well recognised in international literature as a pathway to abusive head trauma, often with devastating consequences (Blumenthal, 2002; Colbourne, 2015). Despite a wealth of international evidence, there is little data to suggest that shaking is a form of child maltreatment in South Africa. This is surprising given that the country has amongst the highest recorded under-five mortality rate (The United Nations Inter-agency Group for Child Mortality Estimation, 2018) and infanticide rate worldwide (Abrahams et al., 2016); and, therefore, one might reasonably expect to find evidence for its occurrence.

This is the first study to investigate whether shaking itself occurs in South Africa. Of data from 385 female caregivers living in disadvantaged areas in Cape Town, the findings confirmed that 13.2% (n = 51) of the sample has shaken their infants (under the age of one), and boys were nearly twice as often the victims of shaking. Twenty percent (n = 77) of all caregivers reported having thoughts of shaking. Clearly, thoughts of shaking may be a risk factor, but do not indicate that a baby *will* be shaken, and it would be worthwhile to investigate what intervened to prevent shaking.

In descending order of the most commonly reported triggers of shaking (as described by participants during the moment of shaking), three interrelated themes were identified in this study: inconsolable infant crying, anger or frustration, and stress. Inconsolable crying was identified as the primary trigger, and other related triggers included not knowing why infants cried inconsolably, and exhausting all methods of soothing in response to inconsolable crying. For the second theme, more than half of all caregivers reported feeling angry before shaking their babies, and nearly one quarter of all caregivers felt frustrated - these emotions were most often connected with the child's inconsolable crying. The third trigger was stress: commonly defined as pressure or strain, stress can be physical, emotional, or psychological in nature (McEwen & Sapolsky, 2006). Nearly one quarter of all caregivers reported feeling stressed before shaking their infants, most often in response to inconsolable infant crying, but also from external stressors like community violence and poverty.

The predictors of shaking, thoughts of shaking, and knowledge of the dangers of shaking are identified in this study (see Table 26). The predictors of shaking are based on the findings from two independent models. In the final model, participants who had thoughts of shaking were nearly three times more likely to shake their infants. Because it seems reasonable to expect that caregivers might very well shake their children if they have

thoughts of doing so, it is important to explore the more distal predictors of shaking, as identified in the semi-final model.

The participants' methods to soothe infant crying were also examined in this study. Three primary response categories emerged, these were: infants' physiological needs (e.g., giving food, changing a dirty nappy, providing comfort), infants' social and emotional needs (e.g., playing with the baby, singing or talking to the child), and caregivers' coping responses (e.g., going for a walk with the infant, giving the infant to someone else). In terms of how the two independent groups of participants (i.e., self-reported shaking vs. not shaking) responded differently to their children, caregivers who did not shake their children were almost four times more likely to report that their infants were easy going, contented children. These caregivers were also more likely to report that they would put their infant down to self-soothe in a safe place when they felt frustrated or upset with the child's crying.

Explanations for Findings

Because the violent shaking of young children is identified as a form of child maltreatment in this study, there clearly is a disconnect between what women (and possibly other caregivers) in South Africa are doing to their children, and the injuries seen by paediatricians and forensic pathologists. The present research offers two possible explanations for the disconnect between the rates of shaking as identified in this study, and the dearth of data in the South African literature.

The first explanation may be that because South Africa is a country with extreme levels of violence (Seedat et al., 2009), children who are shaken endure other forms of abuse that may obscure that they have also been shaken. This hypothesis is supported by a recent case report which describes the death of a female child under the age of three in the Gauteng province of South Africa (Hope v. The State, 2016).

> The deceased played with her food by rubbing it into the carpet. The accused [stepmother] became very angry, scolded her and shook her aggressively out of anger. The deceased cried continuously and the accused hit her very forcefully with an open hand where after, the deceased fell backwards and stopped crying. The accused immediately realised that she had gone too far and that something was seriously wrong with the deceased. The deceased was unconscious.

In this example, shaking preceded blunt force trauma. The cause of death was reported as "severe head injuries, consisting of a large subdural hematoma as well as sub-arachnoid

bleeding" (Hope v. The State, 2016, p. 4). Given that shaking (Adamsbaum et al., 2010) and blunt force trauma have both shown to independently result in abusive head trauma injuries (e.g., a subdural hematoma; Talvik et al., 2007), arguing from harm back to shaking as the cause can be difficult. It may also well be that shaking is just one component of more serious abuse in South Africa. For example, findings from the South African National Child Homicide study showed that in 2009, blunt force trauma was the second most common cause of death in children under 5 years old (n = 73; 30.7%; Mathews et al., 2013), yet shaking was never identified as contributing to or causing a single death. It is, therefore, possible that shaking injuries might be concealed by blunt force trauma in some of these instances. Similarly, this could mean that in cases that are not fatal, more obvious signs of injury could obscure shaking injuries.

A second possible explanation for the disconnect is that shaking is not recognised as a cause of injury or death in South Africa, hence it is being missed. This argument is reflected in how children are assessed at the Red Cross War Memorial Children's Hospital in Cape Town – the only tertiary hospital exclusively for children in sub-Saharan Africa, and hence, where one would reasonably expect to find evidence of injury from shaking. A trauma record form is completed for all patients presenting to the trauma unit at the hospital – the form includes an extensive list of predefined cause-of-injury categories, but shaking is not provided as an option in this list. From this perspective, it seems that key role players who investigate child maltreatment (healthcare practitioners, police officers, social workers etc.) need to ask explicitly about shaking, otherwise we cannot know if children in South Africa are being violently shaken; and similarly, if shaking actually leads to injury.

It is also possible that shaking, as a cause of death, is being missed on post-mortem examination in South Africa – to date, it has not been identified in reviews of child homicide in the country (Abrahams et al., 2016; Mathews et al., 2013). In addition to shaking not being recognised as a cause of death in South Africa, another possible reason for why it is not identified is that studies recommend using a multidisciplinary team of specialists (e.g., forensic neuropathologists, paediatric ophthalmologists and radiologists) to diagnose fatal abusive head trauma from shaking (Matschke et al., 2009b; Morad et al., 2003). This range of human (and financial) resources may, however, not be available in South Africa, and it is emphasised in that the country has amongst the highest reported annual incidence of non-natural deaths worldwide, all of which require a costly (and time consuming) medico-legal examination conducted by comparatively few forensic specialists (Chibambo, 2016).

In summary, the disconnect between self-reported violent shaking in this study and the dearth of South African literature is currently understood from two possible perspectives: (1) shaking is obscured by more serious and/or obvious forms of child maltreatment, and (2) shaking is not identified as a cause of injury or death at multiple levels in South Africa, e.g., hospitals, mortuaries etc.

Triggers of shaking.

Inconsolable infant crying. Because infants cry to communicate (and because crying is part of normal early childhood development; Sigelman & Rider, 2009), children will continue to be at risk of shaking because it can be expected that they will cry, sometimes inconsolably. In line with this reasoning, it is imperative to understand how crying (and inconsolable crying, more specifically) influenced the risk that infants in this study were shaken.

Because infants lack control over their emotional arousal, they depend on their caregivers to regulate their emotions (Frankel et al., 2012). From this perspective, an "infant's crying can have two possible consequences: it may elicit tenderness and desire to sooth, or helplessness and rage" (Kim, 2011, p. 229). For this reason, inconsolable crying may have been more likely to cause distress in the mother-infant relationship, thereby influencing how a caregiver responded to her baby (Kim, 2011; Räihä, Lehtonen, Huhtala, Saleva, & Korvenranta, 2002). More specifically, research has described some of the consequences that result from the many psychosocial and somatic effects of inconsolable crying on caregivers. For example, chronic exhaustion and overload are a consequence of persistent alarm and sleep deficit, and the repeated experience of inconsolable infant crying may lead to feelings of failure, diminished self-esteem, powerlessness, and depression (Kim, 2011; Nash, Morris, & Goodman, 2008). Consequently, feeling helpless in the face of persistent, unexplained crying could lead to aggressive feelings and powerless rage toward the infant (Kim, 2011).

Anger or frustration. Feelings of anger can lead to aggression, the latter which can be defined in many ways (Gardner & Moore, 2008; Scarpa & Raine, 1997). Most applicable to this study is the form of aggression known as reactive or hostile aggression; i.e., "aggressive behaviour in response to real or perceived threat, provocation, or frustration, and is typically impulsive, immediate, and directed toward the perceived perpetrator" (Berkowitz, 1993; Lickley & Sebastian, 2018, p. 313). Because anger is a commonly experienced emotion which has shown to impact on judgement and decision-making (Clore & Huntsinger, 2007; Litvak, Lerner, Tiedens, & Shonk, 2006; Scarpa & Raine, 1997), it can be tentatively

concluded that caregivers in this study most likely did not plan to violently shake their children, but rather that the provocation of a stimulus like inconsolable infant crying increased the propensity that feelings of anger or frustration materialised into reactive aggression in the form of shaking. From this perspective, the use of anger management skills is suggested as one possible strategy to help prevent feelings of anger or frustration from turning into explosive rage.

Caregiver stress. Parenthood is a time marked by adjustments and challenges which can be expected to cause stress (Cowan & Cowan, 2000). Caregivers in this study frequently reported that inconsolable infant crying was a source of stress. Research has shown a link between stress and a lower tolerance for frustration (Hendricks, Bore, Aslinia, & Morriss, 2013; Mahon, Yarcheski, Yarcheski, & Hanks, 2007), and similarly, other studies have shown that caregivers who are stressed are more likely to respond harshly to their children (Jackson & Choi, 2018; Mortensen & Barnett, 2015). Regarding this study, caregivers who felt stressed in response to infant crying may have been more likely to shake their children because their stress impacted on their ability to cope with their frustration in the moment.

Poverty and community violence were also external sources of stress for caregivers in this study. Contextual factors such as these can be conceptualised within Bronfenbrenner's ecological-systems framework to show how parenting is located within broader contexts, which influence a child's development within the family system (Lester & Preston, 2013). Regarding poverty, it falls within the macrosystem of the ecological framework; the latter defined as more distal influences, including socio-economic factors (Ward, Dawes, & Matzopoulos, 2012b). In terms of how poverty can be a source of stress, it increases the difficulty of parents to be able to provide for their children (Ward et al., 2015), particularly in areas of disadvantage where the influence of stress from poverty is high (Freisthler & Maguire-Jack, 2015; Jackson & Choi, 2018). This is supported by the family stress model (Conger & Conger, 2002), which posits that economic hardship leads to economic pressure; and the latter increases parental emotional distress and interpersonal conflict which can contribute to harsh parenting (Neppl, Senia, & Donnellan, 2016). There is also a host of literature that has shown that children living in financially-strained households are at higher risk of child maltreatment (Lefebvre et al., 2017). Therefore, caregivers in this study who were economically deprived may have been more likely to shake their children because their capacity to provide appropriate care was impacted by the stress of poverty.

In terms of community violence, it falls within the exosystem of the ecological-systems framework; defined as "contexts that affect families, their neighbourhoods, extended

family systems, and services" (Ward et al., 2012a, p. 215). For caregivers in this study, it seemed that higher levels of community violence increased caregiver stress by hindering access to social support during their time of need (e.g., at night time, when infant's cried). Because effective parenting is thought to be influenced by available social support (Ward et al., 2012a), stress associated with a lack of access to support could have contributed to caregivers responding more harshly to their children. Taken together, the findings suggest that in the context of South Africa, persistent daily stressors like poverty and community violence appear to increase stress and lower tolerance for infant crying. This could mean that the cumulative nature of stress may exacerbate the risk for violent shaking, particularly within disadvantaged communities where associated stress is high.

In summary, the three triggers of shaking in this study were inconsolable infant crying, anger or frustration, and stress. Independently, each trigger influences the risk for shaking, but the triggers can also be conceptualised as a triangular relationship, with each trigger exerting influence on the other. For example, infant crying can be a source of either anger or stress, but caregivers who are angry or stressed may also be more likely to respond harshly to inconsolable infant crying.

Predictors of shaking. In this study, shaking was the ultimate outcome. In other words, the study asked: do caregivers violently shake their infants, and if they do, how can shaking be prevented? Because shaking has proximal predictors of thoughts of shaking and knowledge of the dangers of shaking (see Table 26), the predictors from the latter two outcomes are considered in terms of the risk for shaking – they may be more distal from the immediate predictors of shaking, but nevertheless, they play a role.

Thoughts of shaking was the single strongest predictor of shaking, which can be somewhat expected because it seems reasonable that caregivers might very well shake their children if they have thoughts of doing so. Regarding inconsolable infant crying, caregivers were twice as likely to shake their infants when they cried inconsolably. A comprehensive explanation as to why infant crying can be a predictor of shaking was discussed earlier, and for this reason, is not duplicated here. Infant age as a predictor could not be interpreted because it represented the child's age at the time of the interview (and not when the child was shaken), hence, no conclusions could be drawn. All other predictors are explained in terms of how they can be predisposing factors for shaking.

***Alcohol use*.** It is well established in the literature that alcohol use (and excessive drinking, in particular) alters physical and cognitive function, leading to behavioural changes that can increase the risk for child maltreatment (World Health Organization, 2006). More

specifically, research has shown that alcohol consumption can lower inhibition, affect judgment and reasoning, and is linked to more negative, harsh parenting (López-Caneda, Rodríguez Holguín, Cadaveira, Corral, & Doallo, 2014; Mayes & Truman, 2002). In line with this reasoning, one possible explanation for the violent shaking of young children may be that caregivers who drank alcohol were less able to inhibit responding aggressively to their infant's crying. Caregivers who drink alcohol may, therefore, be less able to tolerate frustration from infant crying, and more likely to react impulsively in the form of shaking.

Because participants in this study lived in neighbourhoods of high disadvantage, community-level determinants of alcohol use are also considered. Studies have shown that a large majority of alcohol in lower socioeconomic areas in South Africa is "sold at informal shebeens [bars] as opposed to licensed outlets" (Leslie et al., 2015, p. 191; Parry, 2010). Because socioeconomic disadvantage is thus linked to higher concentrations of unlicensed outlets, alcohol is generally cheaper and easier to access (Bowers et al., 2014; Campbell et al., 2009). From this perspective, the risk for violent shaking may be higher if the structural conditions of communities foster environments of high alcohol consumption.

Knowledge of the dangers of shaking. Caregivers with a lower knowledge of the dangers of shaking were more likely to report that they would shake their children, as well as have thoughts of violently shaking their children. One possible explanation for the findings is that because caregivers did not know that shaking can lead to serious harm (i.e., death, or severe physical and cognitive disability; Hobbs et al., 2005; Jenny et al., 1999; King et al., 2003), they may have thought that shaking was harmless and/or less serious than other forms of child maltreatment, e.g., hitting or smothering an infant.

Caregiver history of childhood abuse. Caregivers who endured more physical and emotional abuse during their childhoods (i.e., before 18 years old) were more likely to have thoughts of violently shaking their children. In terms of the Apartheid regime in South Africa, it left a legacy where the use of corporal punishment is normalised as a strategy for discipline today (Morrell, 2001), and where child maltreatment rates are high. From this perspective, caregivers who were abused as children may be more likely to model violent behaviour (like thinking about shaking their children), because they were socialised into accepting violence as normal discipline and/or behaviour.

Caregiver age. Regarding two outcomes that were assessed in this study (thoughts of shaking and knowledge of the dangers of shaking), caregiver age was associated to these outcomes in ways that were expected. Specifically, younger caregivers were more likely to have thoughts of shaking, and older caregiver age was protective because older caregivers

had more knowledge of the dangers of shaking. Taken together, it can be suggested that younger caregivers may have been more inclined to think about shaking (and therefore, actually shake their children) because they knew less about the dangers of shaking.

Some research has shown an association between young maternal age and child maltreatment in general (Brown, Cohen, Johnson, & Salzinger, 1998; Mersky et al., 2009) – findings specific to shaking could not be found. For example, young caregivers are more often poor, single, undereducated, and have unplanned pregnancies (Mersky et al., 2009), and for these reasons may experience higher levels of stress that can negatively impact on parenting, e.g., like having thoughts of violently shaking children. Another possible reason why younger caregivers were more likely to think about shaking is because they could have had less experience in parenting, meaning that their methods of dealing with parenting challenges (e.g., inconsolable infant crying) could be more punitive at times.

Responses to infant crying. From the current research, caregivers who did not respond well to infant crying were more likely to report having thoughts of shaking. More specifically, these caregivers were less willing to (1) share information with other parents about responding safely to infant crying, (2) pass their infant to someone else, and (3) leave their infant alone to self-soothe (even when they felt frustrated with the infant's crying). Taken together, having some form of social support in addition to using appropriate techniques to respond to infant crying may have helped prevent shaking (by reducing the chance that caregivers would have thoughts of violent shaking).

Social Support. Caregivers with more social support had more knowledge of the dangers of shaking, and lower social support trended towards being identified as a predictor of shaking. Regarding knowledge of the dangers of shaking, it may be that social support improved caregivers' overall knowledge because it increased the potential for information sharing (i.e., informational support), both verbally and practically (the latter could, for example, include observing positive parenting practices). Additionally, it is possible that having more social support could have prevented shaking through access to emotional and physical support. For example, caregivers who felt overwhelmed by their infant's crying may have benefitted from having someone to talk to, or someone who could have cared for the baby if the mother needed a break. For those with limited social support, it can be motivated that support groups (e.g., in clinics) may increase social cohesion and thus knowledge of shaking, particularly in areas of high disadvantage where support may be harder to access.

Infant gender (male). In this study, boys were nearly twice as often the victims of shaking. Overall, it seems that male infants in South Africa may be at higher risk of abuse

from shaking. It is not clear why boys are at higher risk, but one possible explanation is that boys are thought to need more corporal punishment (Janssen et al., 2013). Similar stereotypical cultural expectations have been expressed by parents of infants in the United Kingdom, i.e., that boys are stronger and can withstand rougher handling (Nash et al., 2008).

In summary, because thoughts of shaking and knowledge of shaking are proximal predictors of shaking, the predictors of all three outcomes were included to show how they are interlinked and together increase the risk for violent shaking. The predictors that were identified are: thoughts of shaking, inconsolable infant crying, alcohol use (and abuse), knowledge of the dangers of shaking, caregiver history of childhood abuse, caregiver age, responses to infant crying, social support, and male infant gender.

Indigenous methods of soothing. Two primary differences were observed in terms of how the two independent groups of caregivers (i.e., shaking vs. not shaking) responded to infant crying. Specifically, caregivers who did not shake their infants were almost four times more likely to report that their children were easy going, contented children. They also reported that they would leave their infant to self-soothe in a safe place when they felt frustrated or upset with the infant's crying.

In terms of easy-going, contented children, temperament may influence the risk for shaking. Although temperament can be defined as a stable and enduring trait, it is also affected by child-rearing practices (Frankel et al., 2012; Hong & Park, 2012). Temperament styles include, but are not limited to: easy, difficult, and slow-to-warm-up children (Thomas & Chess, 1957). Whether caregivers classify children as having "easy" or "difficult" temperaments depends on "parental and cultural values, attitudes, and practices" (Hong & Park, 2012, p. 453).

Research has shown that children who are perceived as "difficult" are more likely to elicit negative parenting, whereas children who are perceived as easily soothed receive warmer, more positive parenting (Micalizzi, Wang, & Saudino, 2017). Similarly, negative parenting can exacerbate difficult temperament in children (Lengua & Kovacs, 2005; Micalizzi et al., 2017). Taken together, temperament and parenting style may impact on the type and quality of caregiver-infant attachments, influencing the risk for maltreatment. In terms of shaking, caregivers who self-reported shaking did not explicitly state that their children were "difficult", although this is identified as one possible factor that could have increased the risk for shaking (and the use of other punitive responses which included shouting, smacking, and ignoring children). In addition, caregivers who did not shake their

children reported that their infants were “easy” when they had not cried inconsolably; suggesting that children may be perceived as “difficult” when they cry more.

Leaving infants to self-soothe in a safe place when caregivers felt frustrated or upset with their infants’ crying seemed to be protective. Because crying can be provocative, this response may have prevented shaking if caregivers were less likely to target impulsive reactions toward the infant. Of interest, nearly half of all caregivers in this study reported that they would never leave an infant alone to self-soothe: unless caregivers have alternative methods to deal with feelings of frustration connected with the infant’s crying, they may take their frustrations out on their children by shaking them. In support of this, abusive head trauma prevention programs encourage caregivers to first calm themselves before attending to their distressed children (Centers for Disease Control and Prevention, 2014).

Pre- and postnatal classes could include infant self-soothing as a method of responding to infant crying, particularly from the angle of helping caregivers learn appropriate anger management strategies. This suggestion should, however, be considered from the context that caregivers from disadvantaged communities may not have the necessary resources (e.g., a safe, contained space) in which to leave an infant alone to self-soothe. In these instances where leaving an infant alone to self-soothe might pose more risks than it does benefits, alternative context-appropriate solutions need to be considered.

Integration of Findings with Past Literature

In this study, the incidence of shaking was 13.2% (*n* = 51) in South Africa, an upper middle-income country, and for thoughts of shaking it was 20% (*n* = 77). The violent shaking of young children has seldom been explored in the literature as per this study, meaning that the findings could only be compared to three other studies, which could be identified, and which examined the incidence of shaking.

In the United States, a high-income country, the self-reported incidence of shaking was among the lowest at 2.6% (*n* = 37) in a sample of mothers with children under age two (Runyan et al., 2010). The prevalence in response to infant crying among mothers of 4-month-old infants in Japan, a high-income country, was 3.9% (*n* = 255; Fujiwara et al., 2016), and in the Netherlands, also a high-income country, the rate was 5.7% (*n* = 185) among infants aged 1 to 6 months old (Reijneveld et al., 2004). In Egypt and India, both lower-middle income countries, incidence rates ranged between 12 and 13% (*n* range = 76 to 130) in four communities, although rates were significantly higher in eight other communities in India (the latter which were predominantly rural and urban slum areas), and ranged between 22 and 63% (*n* range = 154 to 571; Runyan et al., 2010). The comparisons made

must be interpreted in light of a limitation: the study by Runyan et al. (2010) did not define shaking, meaning that some mothers could have reported milder jostling as shaking. For this reason, the reported rates in the study by Runyan et al. (2010) could be inflated – a limitation not of this study.

Overall, incidence rates for shaking are only available from few countries (including from this study), although it appears that rates are higher in lower-income countries. One possible reason for this may be that caregivers living in poorer countries face higher risk levels for shaking. For example, poverty has been linked to higher levels of stress (Hamad, Fernald, Karlan, & Zinman, 2008; Lund et al., 2010), and research has also shown that community violence can be higher in areas of higher socioeconomic disadvantage (Walling, Eriksson, Putman, & Foy, 2011), the latter possibly restricting access to social support. Taken together, stress associated with increased economic hardship and community violence, as well as low social cohesion may make responding to a provocative stimulus like inconsolable infant crying harder, and thus increase the risk for violent shaking.

Triggers and predictors of shaking.

***Inconsolable infant crying*.** In this study, inconsolable crying was identified as the primary trigger of shaking, a finding consistent with the majority of research on abusive head trauma in young children (Adamsbaum et al., 2010; Altman et al., 2011; Centers for Disease Control and Prevention, 2014; Mann et al., 2015; Nash et al., 2008). Inconsolable infant crying was also a predictor of shaking more generally. Universally, it appears that inconsolable infant crying increases the risk for violent shaking, and may even extend to other forms of child maltreatment.

***Anger or frustration*.** Heightened negative emotion was a powerful trigger of shaking in this study, a finding that converges with a host of other research which shows a relationship between aggressive feelings and violent behaviour in the form of shaking (Adamsbaum et al., 2010; Lazoritz & Palusci, 2001; Nash et al., 2008). In these studies, excerpts from perpetrator statements included expressions like: "I've blown a fuse…", "I didn't want to choke him, but I wanted him to stop crying", and "I had fits of anger… I got worked up" (Adamsbaum et al., 2010; p. 551). In another study, violent shaking was related to a failure in caregiver impulse control, where perpetrators lost their temper or snapped when they could not stop an infant's cry (Lazoritz & Palusci, 2001). In South Africa, the findings from a judicial investigation concerning the death of a 2-year and 7-month-old child also reflect feelings of intense anger: "the accused became very angry, scolded her [the

deceased] and shook her aggressively out of anger" (Hope v. The State, 2016). The findings from a meta-analytic review of child maltreatment literature also found that parent anger or hyper-reactivity ["this assessed the parent's agitation, physiological arousal, and negative affect in response to a given stimulus"] was the strongest risk factor for child physical abuse (Stith et al., 2009, p. 15).

Knowledge of the dangers of shaking. Because a lower knowledge of the dangers of shaking was associated with shaking in this study, it can be tentatively concluded that by increasing knowledge of the dangers of shaking, it may help to prevent shaking. To support this, two studies have shown that higher knowledge of the dangers of shaking was linked to a reduction in the frequency of shaking injuries internationally (Altman et al., 2011; Dias et al., 2005). It has also been suggested that preventative interventions like the *Period of PURPLE Crying* (Barr et al., 2009a) – which includes knowledge of shaking as a program component – may be more effective with caregivers who have low baseline levels of knowledge of shaking (Ornstein, Fitzpatrick, Hatchette, Woolcott, & Dodds, 2016).

Caregiver age. In a recent study in Japan, young maternal age was identified as a predictor of shaking (Fujiwara et al., 2016). Similar findings were also reported in a study where mothers younger than 25 years old were nearly three times more likely to report that they would shake their 3- to 4-month-old infants (Isumi & Fujiwara, 2017).

Because the finding in this study was similar to the literature, it can be motivated that knowledge of the dangers of shaking should be incorporated into pre- and antenatal classes, as well as intervention initiatives, particularly with a focus of reaching younger caregivers who may be less informed about the dangers of shaking. The latter is supported by research, which has shown that older caregivers possess more parenting knowledge that has consequences for children's health and well-being (Bornstein, Cote, Haynes, Hahn, & Park, 2012; Moore & Brooks-Gunn, 2002).

Infant gender (male). Boys were nearly twice as often the victims of shaking, and male infant gender was identified as a predictor of shaking. These findings are in accordance with most other abusive head trauma literature which too has shown this trend (Adamsbaum et al., 2010; Centers for Disease Control and Prevention, 2014; Chibambo, 2016; Janssen et al., 2013; King et al., 2003; Mattes, 2016; Nuño et al., 2015; Talvik et al., 2006); however, it is currently not clear why boys are more likely than girls to be shaken. Research has suggested that caregivers possibly expect unrealistic developmental and behavioural achievements from male infants (Altimier, 2008), and that their gender role expectations may also play a role. For example, caregivers who have strong traditional gender norms may believe that boys are

more aggressive and require greater discipline (Dawes, De Sas Kropiwnicki, Kafaar, & Richter, 2005). Further research is needed to enhance our understanding of the role that gender plays in the risk for violent shaking.

Social support. There are strong links between social support and positive parenting practices (Gould & Ward, 2015; Taylor et al., 2015), including that social support reduces the risk for child maltreatment (Angley et al., 2015; Ceballo & McLoyd, 2002; Gay, 2005), as well as increases resilience to stress (McConnell et al., 2010; Ostberg & Hagekull, 2000; Ozbay et al., 2007). One way that social support may reduce the risk for child maltreatment is through increased knowledge of parenting. For example, a recent study in Brazil found that social support increased mothers' knowledge of child development, especially among mothers living in vulnerable areas (Diniz, Santos, & Koller, 2017). From this perspective, caregivers with higher levels of social support may have been less likely to violently shake their children because they knew more about the dangers of shaking. Higher levels of social support have also been linked to less parenting stress (McConnell et al., 2010), and social support was recently identified as a need among female caregivers of young children in health care facilities in South Africa (Masala-Chokwe & Ramukumba, 2017). Therefore, efforts to prevent shaking need to consider including social support as a program component, particularly for caregivers of young children in areas of disadvantage where stress is likely to be high, and access to support lower. Increasing access to social support is, therefore, suggested as one method to intervene during moments of crisis, e.g., inconsolable infant crying where caregivers are at high risk of shaking their children. In considering the economic pressures that caregivers living in areas of higher disadvantage face, low-cost options to increase social support are suggested. For example, toll-free crisis counselling like Childline, South Africa, provides caregivers with emotional support that may help to prevent shaking during moments of crisis. Other options could include conducting online support groups using a free platform like WhatsApp, or formal social groups at near-by clinics.

***Contributions to the literature*.** Some factors in this study appear to have not been researched in terms of shaking, and hence, there is no direct literature to compare the findings to. Instead, the unique contributions of the findings to the literature are discussed.

*Thoughts of shaking***.** Because having thoughts of shaking was the single strongest predictor of shaking in this study, the Thoughts of Shaking Subscale (see Appendix G, Section D) could be used to screen for caregivers at risk of shaking their children, and who may benefit from early intervention. Because the scale asks caregivers about their thoughts in response to infant crying, the assessment needs to be conducted with individuals who have

children (and hence, who have responded to infant crying before). In this scale, sensitive questions are asked (e.g., "Do you smack your children?"), meaning that it is imperative to establish an environment between healthcare providers and caregivers that is non-judgemental, confidential, and with a genuine concern for how caregivers cope with their infant's crying – which will likely facilitate honest feedback. Additionally, research has shown that mindfulness, defined as "a moment-to-moment awareness of one's experience without judgement" (Davis & Hayes, 2011, p. 198), can reduce stress and anger (Wright, Day, & Howells, 2009), meaning that this technique may reduce the risk that thoughts of shaking may lead to actual shaking.

*Responses to infant crying***.** The present research identified the need to equip caregivers with a variety of skills to respond safely to infant crying, as one strategy of broader preventative initiatives with the aim to prevent shaking.

*Alcohol use***.** Alcohol use is strongly linked to child maltreatment globally (Berger, 2005; Giancola, 2000; Prindle, Hammond, & Putnam-Hornstein, 2018; World Health Organization, 2006), and this study contributed to the literature by showing that caregivers' increased alcohol use was linked to shaking. Because of this finding, strategies to reduce alcohol consumption could be considered to help prevent shaking. For example, alcohol-related interventions to reduce child maltreatment have done so by reducing alcohol availability, as well as increasing the price (i.e., tax) of alcohol (Markowitz & Grossman, 1998; World Health Organization, 2006). Other broader level interventions that have been suggested for use in South Africa include "changing the minimum legal purchase age of alcohol" (from 18 to 21 years old); instituting restrictions in terms of when alcohol can be sold and the density of outlets per area (Parry, 2005; Puljević & Learmonth, 2014, p. 185), and policing shebeens: including the illegal sale of alcohol in areas of high disadvantage. This is emphasised from the perspective that research has shown that increased alcohol use was linked to stress from poverty as well as low community cohesion in peri-urban settlements in Cape Town (Puljević & Learmonth, 2014). This may mean that caregivers who live in these areas may be more likely to violently shake their children because they are exposed to other risk factors that increase the risk for hazardous alcohol consumption.

Caregiver history of childhood abuse. There are mixed findings regarding the intergenerational cycle of abuse (Brown et al., 1998; Schelbe & Geiger, 2017; Widom et al., 2015); although this study has shown that caregivers who experienced physical and/or emotional abuse before 18 years old were more likely to have thoughts of shaking their children (and thus, were more likely to actually shake their children).

Caregiver stress. A host of literature provides support for the association between caregiver stress and a higher risk for child maltreatment. Similarly, research has also shown that stress can promote aggression and violence (Kruk, Halász, Meelis, & Haller, 2004). Regarding stress from poverty, the finding in this study aligns with research which has examined the relationship between community poverty and child maltreatment, and has shown that parents who are economically distressed respond more harshly to their children (Ben-Arieh, 2010; Freisthler & Maguire-Jack, 2015; Fromm, 2004; Jackson & Choi, 2018; Mortensen & Barnett, 2015). Similar findings were also observed in a recent study, which found a link between economic pressure and increases in harsh parenting in a sample of Mexican mothers with young children (Neppl et al., 2016; White, Liu, Nair, & Tein, 2015). In terms of stress from community violence, a systematic review of the literature on the relationship between neighbourhoods and child maltreatment provides support for the argument that high levels of perceived environmental stress, as well as a lack of support, contributes to parenting that is abusive (Coulton et al., 2007). Taken together, caregivers living in areas of higher disadvantage may experience greater levels of stress from poverty and community violence, meaning that the risk for shaking may be elevated in these areas.

Indigenous methods of soothing. Because caregivers who did not shake their children were more likely to report having easy, contented children, the influence of temperament in the role of shaking is considered. In support of this, one study showed that difficult temperament in 5-month-old twins was related to maternal hostile-reactive behaviour (Boivin et al., 2005), while other research has found that children who are easily soothed experience more positive emotionality and warmth from caregivers (Micalizzi et al., 2017; Putnam, Sanson, & Rothbart, 1995). The latter is consistent with this study as caregivers who had not experienced inconsolable infant crying were more likely to report that their children were easy-going, contented children.

In terms of leaving a crying infant alone to self-soothe, this method is recommended as one strategy to help prevent shaking. This is emphasised from the perspective that inconsolable infant crying can be provocative, and may lead to feelings of intense anger or frustration which can increase the risk for violent shaking.

Implications of Findings

The contribution of this dissertation to the literature on abusive head trauma from shaking in young children is twofold. First, the research provides novel insight into the understanding of shaking as a form of child maltreatment as it currently occurs in South Africa. Specifically, the research has expanded the knowledge base by showing that mothers

and other female caregivers have violently shaken their infants, most often in response to inconsolable crying. In line with this reasoning, shaking injuries could be occurring at rates higher than what we currently know or expect in South Africa, and the consequences of misdiagnosis could, therefore, be devastating to young children.

The research provides new insights into preventative initiatives in terms of programme design. To date, most interventions that have aimed to prevent abusive head trauma from shaking in young children have done so by addressing two key factors: inconsolable crying and knowledge of shaking. For example, the *Period of PURPLE Crying* intervention educates caregivers about normal infant crying, the dangers of shaking, and "encourages caregivers to share this information with other caregivers of their infant" (Barr et al., 2009b, p. 973). In terms of the effectiveness of this and other interventions, there are mixed findings (Altman et al., 2011; Barr et al., 2009b; Bechtel et al., 2011; Dias et al., 2005; Keenan & Leventhal, 2010). This research provides support for the development and evaluation of a multifaceted intervention program which considers the impact of the following programme components: responding safely to inconsolable infant crying, using mindfulness to address thoughts of violent shaking, learning appropriate anger management strategies (particularly in response to inconsolable crying), managing parenting expectations and associated stress, increasing knowledge of the dangers of shaking, considering how temperament influences how caregivers respond to their children's needs, and finally, screening and intervening for hazardous alcohol use. Broader level strategies could also include, but are not limited to, reducing community violence through better policing and neighbourhood watches, poverty reduction, and public health interventions. The preventative initiatives could, for example, be incorporated within pre- and antenatal classes, in support groups for at-risk caregivers, and healthcare practitioners (e.g., nursing staff, paediatricians) could also disseminate the information. Additionally, information on the potential for abusive head trauma from shaking should be incorporated within professional tertiary education programmes - currently, it is not being taught in medical schools (this is noted as a personal communication with a forensic pathologist at the University of Cape Town).

Although the results from this study cannot be generalised to the larger population, this research has identified at risk female caregivers from the three clinic sites (these being Seawinds, Klip Road, and Valhalla Park) who may benefit from early intervention. More specifically, caregivers living in these areas who are younger, consume more alcohol, report histories of childhood abuse, who have high levels of stress, and lower levels of knowledge of the dangers of shaking could be considered to be at higher risk of shaking their children.

There are a number of research implications of this dissertation. Firstly, shaking should be added as a cause-of-injury category on the trauma record form at the Red Cross War Memorial Children's Hospital in Cape Town. As a reminder, information from the trauma record form is documented at ChildSafe; the only database that systematically records all cases of trauma, as presented to the trauma unit at the Red Cross Hospital. Essentially, if shaking is included as a cause-of-injury category on the trauma form, this will enable and further research into the incidence of shaking injuries in South Africa. Similarly, this could help clarify if children who are shaken endure other forms of abuse that may obscure that they have also been shaken – a tentative hypothesis made from the study findings. If shaking injuries are formally identified at the Red Cross Hospital, this could also enable longitudinal follow-up of shaken children so as to determine the morbidity outcomes of violent shaking. Additionally, the information from the database can be shared with important personnel (e.g., police and social workers) to encourage the documentation of perpetrator confessions of shaking.

Another research implication is the suggestion to develop a prospective protocol for identifying abusive head trauma from shaking in South African mortuaries. This could help clarify if shaking is a cause of death for infants, as a wealth of international evidence has shown (Dias et al., 2005; Fanconi & Lips, 2010; Hobbs et al., 2005; Keenan et al., 2003; King et al., 2003; Talvik et al., 2006). At an individual level, healthcare providers in South Africa need to be up to date with current knowledge of abusive head trauma from shaking so as to avoid misdiagnosis, particularly since children can present with a wide range of symptoms that range from non-specific to life-threatening (Kemp et al., 2003; Sieswerda-Hoogendoorn et al., 2012).

Further, the risk factors identified here should be incorporated into a shaking prevention programme, and this programme tested for effectiveness.

In summary, the contribution of this dissertation to the literature on abusive head trauma from shaking is that the violent shaking of young children is a confirmed form of child maltreatment in South Africa. This research provides strong motivation for the development and evaluation of an intervention programme with the aim to prevent shaking. Additionally, violent shaking needs to be recognised as a form of child maltreatment across diverse settings in South Africa (e.g., hospitals, mortuaries, educational institutions) to encourage further research into the subject; the latter which will strengthen preventative initiatives.

Limitations of the Study

In terms of design limitations, the present research was a cross-sectional design, meaning that no causal inferences could be made. This also means that extraneous variables not accounted for in this study could provide alternative explanations for some findings (Wilson & MacLean, 2011). For example, caregiver's level of education could have influenced the risk for shaking based on the hypothesis that participants with a lower level of education may have known less about the dangers of shaking, and hence, were more likely to shake their children. Therefore, confounding effects may have threatened the internal validity of this study; the latter defined as the "ability of a research design to adequately test hypotheses" (Wilson & MacLean, 2011, p. 94).

In hindsight, the other issue that could have affected internal validity was with regard to information that was not collected. Specifically, infant crying was not quantified in this study, meaning that it is unknown how long caregivers actually tolerated infant crying before shaking their babies. This also means that comparisons to definitions of excessive crying in other studies cannot be made, i.e., "crying and fussing for more than 3 hours a day, for more than 3 days a week, and for more than 3 weeks, in an infant who is well-fed and otherwise healthy" (Kim, 2011, p. 231; Wessel, Cobb, Jackson, Harris, & Detwiler, 1954).

There was also no assent form for minors, meaning that caregivers younger than 18 years old were excluded because they did not have the capacity to give consent for participation under South African law. Because research has shown that adolescent mothers may make lifestyle choices (e.g., engaging in casual sexual relationships or consuming alcohol), which could lead to unplanned pregnancies (Scannapieco & Connell-Carrick, 2016), younger caregivers might also pursue lifestyles and other activities that reduce the potential for nurturing and supportive childcare (Makoae et al., 2008). From this perspective, it would have been useful to examine if adolescent caregivers are more likely than older caregivers to shake their children; a finding that would inform the structure of prevention programmes going forward.

Fathers and other primary male caregivers were excluded from participating in this study, primarily because they were harder to access (based on observation, very few male caregivers brought their children to the clinics). It was, therefore, not assessed whether the gender of the perpetrator was associated with the risk for violent shaking in South Africa. Most international literature has shown that males are the most common perpetrators of abusive head trauma from shaking (King et al., 2003; Lazoritz & Palusci, 2001). In South Africa, one study showed that men were the most common perpetrators (64.8%, $n = 24$) of

non-accidental head injury in children younger than three years old, followed by women (24.3%, *n* = 9), and in four cases (10.9%) the gender of the perpetrator was unknown (Fieggen et al., 2004). Therefore, if men may be more likely to shake their children, the incidence of shaking could be higher than the rate (13.2%) reported in this study.

Other information that was not collected (and which could have impacted the internal validity of this study) was (1) the child's age at the time of shaking, and (2) whether or not shaken children exhibited post-shaking symptoms. Because infant age did not represent the child's age at the time of shaking, infant age (as a predictor of shaking) could not be interpreted, limiting the understanding of this finding. Similarly, by not asking whether infants displayed any physical post-shaking symptoms (e.g., exhaustion, vomiting), the findings do not provide insight into the potential for injury from shaking. The latter would have supported the recommendation of including shaking as a cause-of-injury category on the Red Cross Children's Hospital trauma unit record form.

The external validity of this study, defined as the ability of the research findings to extend beyond the present sample, to other populations, settings, and conditions (Wilson & MacLean, 2011), is limited. To collect data, a convenience sample of clinics was used, meaning that the findings cannot be generalised to the larger population. Of note, this study was also conducted with health-seeking caregivers, meaning that women who did not bring their children to the clinic for routine care (and who may be more likely to maltreat their children) are not represented in this sample.

In terms of measurement issues, the data in this study relied on parental self-report, meaning that under- or over-reporting of information could have affected the results. An inherent weakness of self-report data is the possibility of social desirability bias; meaning to respond in a socially acceptable way, making one appear more favourable (Cozby, 2009). It is possible that participants in this study underreported shaking (a socially undesirable behaviour), particularly if they feared repercussions, stigmatisation, or discrimination as a result of disclosing information. Because the risk of bias was anticipated, the researchers openly communicated the purpose of the study and tried to create an environment that was supportive, confidential, and non-judgemental; and hence, conducive to the sharing of sensitive information. From this perspective, it can reasonably be expected that caregivers gave honest responses (Cozby, 2009).

Another measurement issue was that all researchers collected the data, and this impacted on the sampling process. To be specific, every second person from the list of potential participants at the clinics was meant to be sampled, although the list was shared

amongst the researchers, and at times created confusion as to who had been interviewed. The reasons for missing patients who should have been interviewed are unlikely to be systematically related to the variables that were studied, and so this study nonetheless makes a valuable contribution to the literature.

A final measurement issue was that some of the scales in this study were new (these being the Responses to Infant Crying Scale; the Shaken Baby Scale; the Thoughts of Shaking Subscale; see Appendix G, Sections C and D, respectively) or just met the recommended minimum requirement for reliability (coefficient omega = .70; i.e., the Shaking Knowledge Scale). This means that it is possible that the scale design influenced the study findings.

In terms of statistical analyses limitations, intimate partner violence (an independent variable) was dropped as a predictor from all regression analyses. This was because it resulted in some of the highest correlations and therefore increased the risk for multicollinearity. Because a host of research has shown that being abused by an intimate partner increases the risk for perpetrating violence against children (Fieggen et al., 2004; Jouriles et al., 2008; Stellenberg & Abrahams, 2015; Woollett & Thomson, 2016), it is likely that this risk factor may have increased the risk for shaking.

Finally, the positive predictive value for the predictors of shaking was 55.2%, meaning that together the risk factors correctly predicted shaking just over half of the time. Alternative measures could be used to assess if the limited predictability of the predictors was related to the scales that were used in this study, or whether other factors not accounted for by the present research (such as intimate partner violence) are likely to be largely responsible for explaining what predicted shaking. Notwithstanding the acknowledged limitations, this study is novel research and ultimately recognises that the violent shaking of young children in South Africa is an issue for public concern.

Future Directions

Children are vulnerable to violence by virtue of being children (Department of Social Development et al., 2012). This research has clearly identified a disconnect between the self-reported violent shaking of young children by their caregivers, and the dearth of data in the South African literature. To provide clarification for this disconnect, intersectoral collaboration (e.g., hospitals, mortuaries, police, and social workers) is needed to facilitate and encourage research into the topic of abusive head trauma from shaking in South Africa.

From the current findings, it is suggested that this research be conducted with other populations in South Africa, with the aim of identifying whether the risk factors for shaking differ, for example, by socioeconomic context. Similarly, because a host of literature has

shown that men are the most common perpetrators of shaking (King et al., 2003; Lazoritz & Palusci, 2001), it would be useful to examine if this trend applies within South Africa. Together, these findings would contribute to the literature of shaking as a form of child maltreatment in South Africa, in addition to having critical programmatic implications like the applicability of preventative interventions by context.

It is suggested that further research into this topic should examine other risk factors for child maltreatment which were not assessed in this study, and which may very well predict shaking. For example, the level of education (Khosravan, Sajjadi, Moshari, Barzegar, & Sofla, 2018), parental drug use (Walsh, 2003), adolescent motherhood (McHugh, Kvernland, & Palusci, 2015), parenting stress (Stith et al., 2009), and disability (Mersky et al., 2009) are all factors which have shown to increase the risk for child maltreatment; and may therefore extend to the risk for violent shaking. Because this research identified that anger or frustration was a powerful trigger of shaking, it should also be assessed as a potential predictor of shaking in future studies.

There are certain design improvements that should be considered going forward. Specifically, additional research can help to clarify if the duration of infant crying influences the risk for shaking. In addition, by recording infant age at the time of shaking, this information can provide a more nuanced understanding of the association between infant age and the risk for shaking. To ensure that the sampling frame is properly adhered to in the future, the primary researcher needs to oversee the sampling process at data collection sites (i.e., clinics or hospitals), and not interview participants. Random assignment of data collection sites could also improve the generalizability so that the findings are applicable to the broader population.

In the interim, the findings from the present research provide strong motivation for the development and evaluation of a shaking prevention programme with the aim of enabling female caregivers in areas of high disadvantage to respond better to their children, in the hope of preventing violent shaking as a form of child maltreatment in South Africa.

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Appendix A

Participant Screening Checklist

Researcher: _____

Participant Number: _____

1. Are you the baby's mother or caregiver?	Yes	No
2. Does your baby live with you?	Yes	No
3. Have you already participated in this survey?	Yes	No
4. Are you 18 years or older?	Yes	No
5. Are you willing to take part in this study? If No, why? _____ _____ _____ _____	Yes	No

Appendix B

Ethical Approval from the City of Cape Town

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

CITY HEALTH

Dr Hélène Visser
Manager: Specialised Health

T: 021 400 3981 F: 021 421 4894 M: 083 298 8718
E: Helene.Visser@capetown.gov.za

2016-04-13

Re: Research Request: Shaken Baby Syndrome: Is Inconsolable Crying a Trigger of Infant Abuse? (6639) (ID No: 10561)

Dear Ms Nefdt,

Your research has been approved as per your request for the following facilities ONLY.

Southern Sub District:	Klip Road, Seawinds, Strandfontein Clinics
Contact People	Dr M Osman (Sub District Manager) Tel: (021) 444-3258/ 083 556 9838 Mrs K Shuping (Head: PHC & Programmes) Tel: (021) 444-3260 / 082 728 4531
Tygerberg Sub District:	Valhalla Park Clinic
Contact People:	Mrs M Alexander (Sub District Manager) Tel: (021) 938-8279 / 084 222 1471 Mrs D Titus (Head: PHC & Programmes) Tel: (021) 938-8281 / 084 308 0596

Please note the following:

1. All individual patient information obtained must be kept confidential.
2. Access to the clinics and its patients must be arranged with the relevant Managers such that normal activities are not disrupted.
3. None of the facilities have secure parking, therefore, parking is at your own risk.
4. Space is problematic. Facilities will only be able to provide you with 1 room (definitely not 2-3 rooms) maximum, if at all possible. Interview space has to be discussed with each facility Manager individually.
5. A copy of the final report must be sent to the City Health Head Office, P O Box 2815 Cape Town 8001, within 6 months of its completion and feedback must also be given to the clinics involved.
6. Your project has been given an ID Number (10561). Please use this in any future correspondence with us.
7. No monetary incentives to be paid to clients on the City Health premises.

Thank you for your co-operation and please contact me if you require any further information or assistance.

Yours sincerely

Signature Removed

DR G H VISSER
MANAGER: SPECIALISED HEALTH

cc. Mrs Alexander & Mrs Titus
Dr Osman & Mrs K Shuping
Dr Jennings

Appendix C

Ethical Approval From the University of Cape Town

UNIVERSITY OF CAPE TOWN

Department of Psychology

University of Cape Town Rondebosch 7701 South Africa
Telephone (021) 650 3414
Fax No. (021) 650 4104

10 March 2016

Ms K. Nefdt
Department of Psychology
University of Cape Town
Rondebosch 7701

Dear Ms Nefdt,

I am pleased to inform you that ethical clearance has been given by an Ethics Review Committee of the Faculty of Humanities for your study, *Shaken Baby Syndrome: Is Inconsolable Crying a Trigger of Infant Abuse?* The reference number is PSY2016-002.

I wish you all the best for your study.

Yours sincerely,

Signature Removed

Johann Louw PhD
Professor
Chair: Ethics Review Committee

Appendix D
Informed Consent

Dear Mother,

You are being invited to participate in a survey about how mothers experience and cope with their babies crying in Cape Town. The University of Cape Town is running the project to see if they can better understand how mothers cope with the frustrations of their babies crying.

If you get involved, what will you be committing yourself to?

- You will be asked to answer some questions in an interview about yourself, your knowledge of infant crying, how you care for your infant, the stress you experience as a mother, your community environment, your social support structures, your lifestyle habits, and how you cope with being a mother. A research assistant will interview you in a private room in the Well Baby clinic, and the interview will last about forty-five minutes.

What happens with all this information?

- All your answers to all questions will be kept anonymous (we can't identify you) because you will be given a participant number that cannot be linked to your name, for instance *Participant 1.* All of this information will be stored on a password safe computer and only the research team will be able to access this information.
- We will use this information to write reports about how mothers experience and cope with their babies when they cry. In those reports, we will not use your name or anything that could be used to identify you.

Is there any reason why we might tell someone about something you said?

- If you tell us that you or your baby is at risk of harm, we will need to make sure that you and your baby are kept safe. In that case, we will work with you to get the help you need. Everything else will be kept confidential.

What will you get out of this?

- You will be able to contribute to our understanding of how mothers experience and cope with their babies when they cry. This information is useful to develop programmes that can help mothers cope with the frustrations that can arise when babies cry.

- You will be given a pamphlet with advice on how to cope with your baby when his/her crying is upsetting you.
- We will provide some refreshments and a small snack during the interview, as well as an incentive for your participation.

What will this cost me?

- There are no costs to you, other than your time.

Are there any risks for me, if I take part in this?

- You might find that the interview can make you tired, but you will be allowed to take a break when you need to.
- Also, you might find some of the questions (for instance, questions about your alcohol use, your own experience of abuse when you were a child, or if you feel depressed) upsetting or embarrassing. Remember, the research team will keep everything confidential.

Do I have to take part in this?

- No. You can say no now, or at any point during the interview or later, if you don't want to take part. You can decide not to answer some of the questions while you are being interviewed. Your participation is entirely voluntary (you can choose whether you want to participate or not).

Who do I contact if I have any questions?

- For questions about the project in general, you can contact:
    - Miss Kirsty Nefdt from the University of Cape Town
        - Tel: 084 794 8106
        - E-mail: kirstals_007@hotmail.com
    - Prof. Cathy Ward from the University of Cape Town
        - Tel: 021 650 3422
        - E-mail: Catherine.Ward@uct.ac.za
- For questions about your rights as a study participant, you can contact the Research Ethics Committee of the Department of Psychology at the University of Cape Town:
    - Mrs Rosalind Adams
        - Tel: 021 650 3417
        - E-mail: Rosalind.Adams@uct.ac.za

Consent to take part in this survey

I agree to take part in the survey about how mothers experience and cope with their babies crying:

- I am choosing to take part in this study.
- I understand that that means I will be interviewed about my experience of being a mother, and that I may be asked some questions that can be slightly upsetting or embarrassing.
- I understand that the information from the interview will be used for reports by the University of Cape Town. I understand that I will not be identified in those reports.
- I understand that if my baby or I are identified to be at risk of harm, the researcher is allowed to give my personal information to someone else who will be able to help me further.
- I understand that there is no particular benefit, cost or risk to me, for taking part in this, other than my time.
- I have been given a copy of this form so that if I have any further questions, I can contact the research team involved.

Name of mother: _____ Name of fieldworker: _____

Signature of mother: _____ Signature of fieldworker: _____

Date: _____

Appendix E

Debriefing Form

Dear Mother,

Thank you for taking the time to participate in the survey about how mothers experience and cope with their babies crying. This form provides you with detailed information about the purpose and procedures of the study, and you are encouraged to ask any further questions that you might have.

What was the purpose of this study?

- The aim of this study was to better understand how mothers respond to their babies when they cry, and whether the risk factors of child maltreatment that you might experience are possibly related to shaking your baby.
- Shaking your baby can be very dangerous and can cause serious injuries to your baby – the name for this condition is called Shaken Baby Syndrome.
- The risk factors that are thought to make shaking your baby more likely or more harmful to the baby are:
    - ✓ Your baby's crying - (This frustrates you)
    - ✓ Your baby's young age - (Younger babies cry more)
    - ✓ Your baby's gender - (Male)
    - ✓ The age at which you had your baby
    - ✓ If you were a victim of abuse
    - ✓ Your relationship status – (Single Parent)
    - ✓ Your level of social support
    - ✓ Your mental wellbeing – (If you have Post-Natal Depression)
    - ✓ If you are unemployed
    - ✓ If you witness community violence where you live
    - ✓ If you consume too much alcohol
    - ✓ If you experience domestic violence in your relationship

What was done during this study?

- You were required to complete a forty-five minute interview that was made up of questionnaires designed to test the risk factors mentioned above.
- This information will be used to determine if these risk factors are linked to the possibility that mothers might shake their babies – this can be helpful to identify infants and parents at risk of harm.

What if I or my baby is at risk of harm?

- All your information is kept confidential (secret), unless you or your baby are at risk of harm (for example, psychological or physical harm). If this happens, the person in charge of the study will give your information to a healthcare practitioner (for example, a nurse or doctor) who will then be able to help you further.

Is there anything else that I am required to do?

- No. If at any point in time you feel stressed by your participation in this research study, or if you have any further questions, please do not hesitate to contact the primary investigator. Finally, here are some useful contact details that offer free counselling services.

Post Natal Depression:

- The Post Natal Depression Support Association of South Africa (PNDSA).
    - National help-line: 082 882 0072
    - Sms ‘help’ and your name to 082 882 0072 and they will contact you.
- For any emergencies, please call the South African Depression and Anxiety Group (SADAG).
    - National help-line: 0800 567 567
    - Sms ‘help’ to 31393

Victim of Violence:

- The Community Intervention Centre (CIC) provides a free 24-hour trauma and crisis intervention service.
    - Between 8:30am – 1pm, phone: 021 528 3005
    - In an Emergency, phone: 082 821 3447
- The Trauma Centre in Woodstock can also offers trauma counselling support.
    - Between 9am – 5pm, phone: 021 465 7373
    - In an Emergency, phone: 082 444 4191

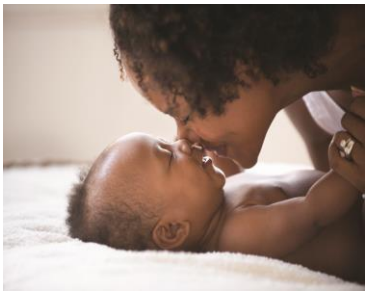
- Families South Africa (FAMSA) offers counselling support to families.
    - Phone: 021 447 7951
    - Elsie's River, phone: 021 946 4744
    - Khayelitsha, phone: 021 361 9098
    - Mitchell's Plain, phone: 021 372 0022

Alcohol or drug abuse

- The South African National Council on Alcoholism and Drug Dependence (SANCA).
    - Phone: 086 14 72622 or 021 945 4080

Appendix F

Abusive Head Trauma Information Brochure


TAKE A BREAK, DON'T SHAKE!

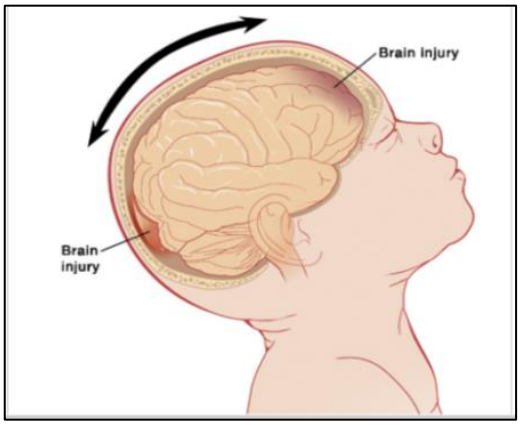
Shaking your baby can be **very dangerous!**

Violently shaking a baby by the shoulders, arms, or legs can cause **brain injury** that leads to ***permanent disability*** or ***death!***

5 seconds of shaking can ***seriously harm*** a baby!

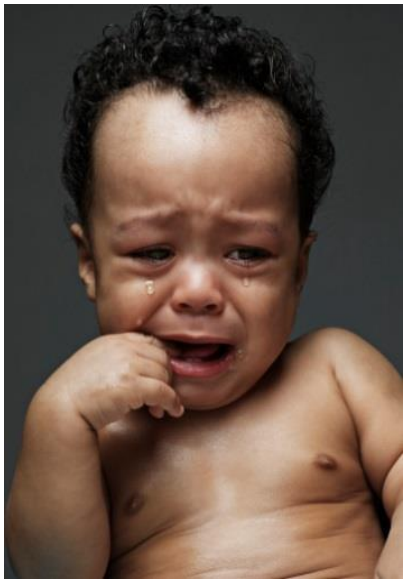
Shaking a baby can also cause:

- Blindness
- Learning disabilities
- Seizures
- Cerebral Palsy
- Problems with movement, speech, and walking.



Shaking makes the brain bounce back and forth against the skull. This causes **swelling, pressure, and bleeding** in the brain.

Why won't my baby stop crying?



Crying is a **normal** phase of infant development

Sometimes Babies can have Crying Patterns

Crying increases around 2 to 3 weeks

Crying is highest around 6 to 8 weeks

Crying decreases around 3 to 4 months

Help! My baby's crying is frustrating me!

1. Remember, you are not a bad parent if your baby continues to cry after you have done all you can to calm him/her!

2. Try calming your baby by:
- Rubbing his/her back
- Gently rocking
- Offering a dummy
- Singing / Talking

- Taking a walk with baby in the pram
- Check if baby is hungry
- Check if baby needs to be burped

3. Check for signs of discomfort like:
- Dirty nappy or rash
- Teething
- Tight clothing
- Fever

4. Call the doctor if you think your baby is injured or ill.
In an emergency, **call 10177**

5. Calm Yourself!
Put your baby in a safe place on his/her back, and then walk away and call someone for support. Check on your baby every 5 to 10 minutes.

6. Understand that you may not be able to calm your baby and that is not your fault, nor your baby's fault! Finally, be aware of signs of frustration and anger in yourself and others caring for your baby
ChildLine Crisis Line,
0800 05 5555

Appendix G

Study Questionnaire

Date: _____

Researcher: _____

Participant Number: _____

Race: _____

SECTION A

Information about your Baby

1. Baby's Date of Birth:	Date: Month: Year:	
2. Baby's Gender	Male	Female

Information about You

3. Your Date of Birth:	Date: Month: Year:			
4. Are you the baby's primary caregiver?	Yes		No	
5. How many children do you have?	Number of children:			
6. Home Language:	English	Afrikaans	IsiXhosa	
7. Marital Status: If single, do you have a boyfriend or partner? _____	Single	Married	Divorced	Remarried
8. Does your partner/spouse live with you?	Yes		No	
9. Highest Level Education:	No Grades/Standards		Never went to school	
	Grades 1-6/ Sub A – Standard 4		Didn't complete primary school	
	Grade 7/ Standard 5		Completed primary	

<table>
<tr><td rowspan="4"></td><td colspan="2"></td><td>school</td></tr>
<tr><td colspan="2">Grades 8-11/ Standards 6-9</td><td>Didn’t complete high school</td></tr>
<tr><td colspan="2">Grade 12/ Standard 10</td><td>Complete high school</td></tr>
<tr><td colspan="2">Tertiary Education</td><td>University/ College/ Technikon</td></tr>
<tr><td rowspan="2">10. Are you currently employed?
If Yes, Full-time or Part-time?</td><td colspan="2">Yes</td><td rowspan="2">No</td></tr>
<tr><td>Full-time</td><td>Part-time</td></tr>
<tr><td>11. Do you receive any social grants?</td><td colspan="2">Yes</td><td>No</td></tr>
<tr><td rowspan="3">12. What is the total yearly income of the household in which you live?
[NOTE: This is the total household income, not your personal income]</td><td colspan="3">Less than R50 000</td></tr>
<tr><td colspan="3">Between R50 000 and R100 000</td></tr>
<tr><td colspan="3">More than R100 000</td></tr>
</table>

SECTION B

<table>
<tr><td>1. How many people are currently living in your household?</td><td colspan="4">Specify:</td></tr>
<tr><td>2. How many children are currently living in your household? (Children are between 0 – 18 years old)</td><td colspan="4">Specify:</td></tr>
<tr><td colspan="5">In the next section, answer either Yes or No (Please circle).
If you answer Yes, how often has this occurred in the past 4 weeks / 30 days?
• Rarely = 1 – 2 times
• Sometimes = 3 – 10 times
• Often = more than 10 times</td></tr>
<tr><td rowspan="2">3. In the past 4 weeks / 30 days, was there ever no food of any kind in your household because of lack of resources to get food?</td><td colspan="3">Yes</td><td rowspan="2">No</td></tr>
<tr><td>Rarely</td><td>Sometimes</td><td>Often</td></tr>
<tr><td rowspan="2">4. In the past 4 weeks / 30 days, did you or any household member go to sleep at night hungry because there was not enough food?</td><td colspan="3">Yes</td><td rowspan="2">No</td></tr>
<tr><td>Rarely</td><td>Sometimes</td><td>Often</td></tr>
<tr><td rowspan="2">5. In the past 4 weeks / 30 days, did you or any household member go a whole day <u>and</u> night without eating anything at all because there was not enough food?</td><td colspan="3">Yes</td><td rowspan="2">No</td></tr>
<tr><td>Rarely</td><td>Sometimes</td><td>Often</td></tr>
</table>

SECTION C

Part 1

The next section asks you questions about your baby when he or she cries.

1. When your baby cries, what do you do to make him/her stop crying?

_____

_____

_____

2. Does your baby ever cry on and on without stopping?

Yes	No

3. If you answered 'No', what do you do that prevents your baby from crying on and on?

_____

_____

_____

4. When your baby won't stop crying, what do you do to make him/her stop crying?

_____

_____

_____

5. When your baby cries, does this ever make you feel irritable, angry, upset, or depressed?

Yes	No

6. The last time you felt frustrated or upset when your baby cried, did you do anything different to make him or her stop crying?

_____

_____

_____

SECTION C

Part 2

The next questions ask about what you do when your baby cries.

3	2	1
Never	Sometimes	A lot of the time

	Never	Sometimes	A lot of the time
When your baby fusses or cries, how often do you…			
1. Pick up your baby	3	2	1
2. Walk around with your baby.	3	2	1
3. Pass your baby to someone else for a while.	3	2	1
4. Feel irritable, angry, upset, or depressed?	3	2	1
5. Take your baby for a walk in his/her pram or on your back or in a kangaroo carrier?	3	2	1
6. Put your baby down in a safe place and walk away because you were frustrated.	3	2	1
7. Tell other people who take care of your baby what to do if they become frustrated with your baby's crying.	3	2	1
8. In general, how often do you tell other people who take care of your baby about when or why babies cry?	3	2	1
9. Take a break from the sound of crying.	3	2	1

	Never	Sometimes	A lot of the time
10. Tell yourself that the crying will end.	3	2	1
11. Tell yourself that your baby is okay.	3	2	1
12. Tell yourself there is nothing you can do.	3	2	1
13. Tell yourself it is not your fault that your baby won't stop crying.	3	2	1
14. Feel guilty if you can't make your baby stop crying?	3	2	1
15. Leave your baby in a safe place and check on him/her every few minutes.	3	2	1

SECTION D

The next section is about how you respond to your baby when he or she is crying. (Before starting this questionnaire, demonstrate all behaviours to the participant using the lifelike infant doll).

0	1	2
Never	Sometimes	A lot of the time

1. When your baby won't stop crying, how often have you…

	Never	Sometimes	A lot of the time
• Rocked your baby in your arms?	0	1	2
• Smacked your baby?	0	1	2
• Sang to your baby?	0	1	2
• Shaken your baby?	0	1	2

2. When your baby won't stop crying, have you ever wanted to…

	Never	Sometimes	A lot of the time
• Leave your baby?	0	1	2
• Shake your baby?	0	1	2
• Smack your baby?	0	1	2

3. If you become angry, frustrated or upset with your baby when he/she won't stop crying, what is the chance that you might…

	Never	Sometimes	A lot of the time
• Give your baby to someone else while you calm down?	0	1	2
• Smack your baby?	0	1	2
• Shake your baby?	0	1	2
• Shout at your baby?	0	1	2

4. When you've tried everything you can to make your baby stop crying, but he/she carries on crying, would you do any of the following…

	Never	Sometimes	A lot of the time
• Give your baby to someone else while you calm down?	0	1	2
• Smack your baby?	0	1	2
• Shake your baby?	0	1	2
• Shout at your baby?	0	1	2

5. Do you ever feel so overwhelmed at times as a new mother that sometimes you think you might…

	Never	Sometimes	A lot of the time
• Give your baby to a family member or friend so that you can have a break?	0	1	2
• Smack your baby?	0	1	2
• Shake your baby?	0	1	2
• Shout at your baby?	0	1	2

6. When babies won't stop crying, do you think it's okay for other mothers, family members or friends who look after babies to do any of the following?

	Never	Sometimes	A lot of the time
• Put the baby down in a safe place and check on it now and then?	0	1	2
• Shout at the baby?	0	1	2
• Shake the baby?	0	1	2
• Smack the baby?	0	1	2

SECTION E

This survey asks you questions about how caregivers care for babies. For this survey, "caregivers" includes: parents, stepparents, babysitters, and childcare providers; babies are children younger than 1 years old.

For the first item, mark an X in the box with the best answer:

7. It is okay for a caregiver to leave a crying baby alone for...

Never	Up to 5 minutes	Up to 15 minutes	Up to 30 minutes	More than 30 minutes

The rest of this survey asks you to give 3 ratings to a list of actions a caregiver might use when caring for a baby. These 3 ratings include:

- Reasonable discipline: Actions that are reasonable/effective for teaching about good or bad behaviour.
- Useful for soothing: Actions that might be used to soothe a crying baby.
- Could cause injury: Actions that might harm a baby.

For each caregiver action on the list, choose one score for each of the three columns. You will be asked to give a score from 1 to 3 for each rating. An action may not make sense for some ratings – you can score these as 1 or disagree for that column.

1	2	3
Disagree	Not Sure	Agree

	Reasonable Discipline	Useful for Soothing	Could cause Injury
8. Rocking the baby in your arms.			
9. Yelling or screaming at the baby.			
10. Distracting the baby with a toy or food.			

	Reasonable Discipline	Useful for Soothing	Could cause Injury
11. Walking while holding the baby.			
12. Withholding or taking away food from the baby.			
13. Shaking the baby.			
14. Talking to the baby.			
15. Smacking the baby.			
16. Holding the baby.			
17. Hitting, slapping, or striking the baby.			
18. Feeding the baby.			

SECTION F

No matter how well a couple gets along, there are times when they disagree, get annoyed with the other person, want different things from each other, or just have fights because they are in a bad mood, are tired or for some other reason. Couples also have many different ways of trying to settle their differences. This is a list of things that might happen when you have differences. Please mark how many times your partner did these things to you in the past year.

0	1	2
Never	Sometimes	A lot of the time

	Never	Sometimes	A lot of the time
1. My partner explained his or her side or suggested a compromise for a disagreement with me.	0	1	2
2. My partner insulted or swore or shouted or yelled at me.	0	1	2
3. I had a sprain, bruise, or small cut, or felt pain the next day because of a fight with my partner.	0	1	2
4. My partner showed respect for, or showed that he cared or she cared about my feeling about an issue we disagreed on.	0	1	2
5. My partner pushed, shoved or slapped me.	0	1	2
6. My partner punched or kicked or beat-me-up.	0	1	2

	Never	Sometimes	A lot of the time
7. My partner destroyed something belonging to me or threatened to hit me.	0	1	2
8. I went to see a doctor (M.D.) or needed to see a doctor because of a fight with my partner.	0	1	2
9. My partner used force (like hitting, holding down, or using a weapon) to make me have sex.	0	1	2
10. My partner insisted on sex when I did not want to or insisted on sex without a condom (but did not use physical force).	0	1	2

SECTION G

1. How often do you have a drink containing alcohol?
    - ☐ Never
    - ☐ Monthly or less
    - ☐ 2 to 4 times a month
    - ☐ 2 to 3 times a week
    - ☐ 4 or more times a week
2. How many drinks containing alcohol do you have on a typical day when you are drinking?
    - ☐ 1 or 2
    - ☐ 3 or 4
    - ☐ 5 or 6
    - ☐ 7, 8, or 9
    - ☐ 10 or more

What drinks are these? E.g., Quartz, wine, whiskey, brandy etc.?

_____

3. How often do you have three or more drinks on one occasion?
    - ☐ Never
    - ☐ Less than monthly
    - ☐ Monthly
    - ☐ Weekly
    - ☐ Daily or almost daily
4. How often during the last year have you found that you were not able to stop drinking once you had started?
    - ☐ Never
    - ☐ Less than monthly
    - ☐ Monthly
    - ☐ Weekly
    - ☐ Daily or almost daily
5. How often during the last year have you failed to do what was normally expected from you because of drinking?
    - ☐ Never

- ☐ Less than monthly
- ☐ Monthly
- ☐ Weekly
- ☐ Daily or almost daily

6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?
    - ☐ Never
    - ☐ Less than monthly
    - ☐ Monthly
    - ☐ Weekly
    - ☐ Daily or almost daily
7. How often during the last year have you had a feeling of guilt or remorse after drinking?
    - ☐ Never
    - ☐ Less than monthly
    - ☐ Monthly
    - ☐ Weekly
    - ☐ Daily or almost daily
8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?
    - ☐ Never
    - ☐ Less than monthly
    - ☐ Monthly
    - ☐ Weekly
    - ☐ Daily or almost daily
9. Have you or someone else been injured as a result of your drinking?
    - ☐ No
    - ☐ Yes, but not in the last year
    - ☐ Yes, during the last year
10. Has a relative or a friend or a doctor or another health worker been concerned about your drinking or suggested you cut down?
    - ☐ No
    - ☐ Yes, but not in the last year
    - ☐ Yes, during the last year

SECTION H

As you have recently had a baby, we would like to know how you are feeling. Please check the answer that comes closest to how you have felt in the past 7 days, not just how you feel today.

1. I have been able to laugh and see the funny side of things.
    - ☐ As much as I always could
    - ☐ Not quite so much
    - ☐ Definitely not so much now
    - ☐ Not at all

2. I have looked forward with enjoyment to things.
    - ☐ As much as I ever did
    - ☐ Rather less than I used to
    - ☐ Definitely less than I used to
    - ☐ Hardly at all

3. I have blamed myself unnecessarily when things went wrong
    - ☐ Yes, most of the time
    - ☐ Yes, some of the time
    - ☐ Not very often
    - ☐ No, never

4. I have been anxious or worried for no good reason
    - ☐ No, not at all
    - ☐ Hardly ever
    - ☐ Yes, sometimes
    - ☐ Yes, very often

5. I have felt scared or panicky for no good reason
    - ☐ Yes, quite a lot
    - ☐ Yes, sometimes,
    - ☐ No, not much
    - ☐ No, not at all

6. Things have been getting on top of me
    - ☐ Yes, most of the time I haven't been able to cope at all
    - ☐ Yes, sometimes I haven't been coping as well as usual
    - ☐ No, most of the time I have coped quite well
    - ☐ No, I have been coping as well as ever

7. I have been so unhappy that I have had difficulty sleeping
    - ☐ Yes, most of the time
    - ☐ Yes, sometimes
    - ☐ No, not very often
    - ☐ No, not at all

8. I have felt sad or miserable
    - ☐ Yes, most of the time
    - ☐ Yes, quite often
    - ☐ Not very often
    - ☐ No, not at all

9. I have been so unhappy that I have been crying
    - ☐ Yes, most of the time
    - ☐ Yes, quite often
    - ☐ Not very often
    - ☐ No, not at all

10. The thought of harming myself has occurred to me
    - ☐ Yes, quite often
    - ☐ Sometimes
    - ☐ Hardly
    - ☐ Never

SECTION I

Please give responses for all questions on a scale from 0 to 2. '*Witnessing'* involves actions that you have seen, whereas *'Victimization'* involves you being the victim in the past year.

0	1	2
Never	A few times	More than 10 times

	Amount of Exposure		
	Never	A few Times	More than 10 times
How many times in the past year have you witnessed...			
1. Someone being chased	0	1	2
2. Break in, other's home	0	1	2
3. Threatened	0	1	2
4. Hit by family	0	1	2
5. Hit by non-family	0	1	2
6. Beaten/Mugged	0	1	2
7. Sexually assaulted	0	1	2
8. Stabbed	0	1	2
9. Shot	0	1	2
10. Gun or knife	0	1	2
11. Gunfire outside, in/near home	0	1	2
12. Gunfire in home	0	1	2
13. Someone wounded	0	1	2
14. Someone killed	0	1	2
15. Dead body	0	1	2
16. Suicide	0	1	2

	Never	A few Times	More than 10 times
How may times in the past year have you been a victim of…			
17. Being Chased	0	1	2
18. Break in, home	0	1	2
19. Break in, not home	0	1	2
20. Threatened	0	1	2
21. Hit	0	1	2
22. Beaten/Mugged	0	1	2
23. Sexually assaulted	0	1	2
24. Stabbed	0	1	2
25. Shot	0	1	2

SECTION J

We would like to ask you questions about your early life, from when you were a child to before you were 18 years old. The questions are about violent or upsetting things that can happen to children and young people. Everything you say is private. No one in your family, your neighborhood, or the authorities will know what you tell us. Please answer all of the questions even if you think some of them do not apply to you.

Sometimes, parents or other responsible adults can't or don't give a child all the care or attention the child needs. Please answer the next questions about whether you experienced this behaviour towards you when you were a child.

We have some questions about violent or upsetting things that can happen to young people. Please think only about the years before you were 18 years.			
1. When you were growing up (before age 18), did any person ever hit or punch you very hard?	Never	Sometimes	Most of the time
2. Before you were 18, did any person ever kick you very hard?	Never	Sometimes	Most of the time
3. Before you were 18, did anyone ever beat you very hard with an object like a stick, cane, whip or belt?	Never	Sometimes	Most of the time
4. Before you were 18, did anyone shake you very hard?	Never	Sometimes	Most of the time
5. Before you were 18, did anyone ever stab or cut you with a knife or sharp object?	Never	Sometimes	Most of the time

6. In general before you were 18, how often were you physically hurt (beaten, hit or other acts) compared with other children around your age at the time?	Never	Sometimes	Most of the time
Sometimes things happen that make children feel very frightened or worried. They may also be made to feel embarrassed or ashamed, or unloved. Please answer each of these questions about events that may have happened to you before you were 18.			
7. When you were growing up (before age 18), did anyone insult and criticize you, to make you feel that you were bad, stupid or worthless?	Never	Sometimes	Most of the time
8. Before you were age 18, did anyone say that you were not loved or did not deserve to be loved?	Never	Sometimes	Most of the time
9. Before you were 18, did anyone say that they wish you had never been born, or were dead?	Never	Sometimes	Most of the time
10. Before 18, were you ever personally threatened that you would be badly hurt or killed?	Never	Sometimes	Most of the time
11. Before you were 18, did anyone threaten to abandon you, or refuse to let you live in the house anymore?	Never	Sometimes	Most of the time

SECTION K

People sometimes look to others for companionship, assistance, or other types of support. How often is each of the following kinds of support available to you if you need it?

3	2	1
None of the time	Some of the time	Most of the time

	None of the time	Some of the time	Most of the time
1. Someone to help you if you were confined to bed.	3	2	1
2. Someone you can count on to listen to when you need to talk.	3	2	1
3. Someone to give you good advice about a crisis.	3	2	1
4. Someone to take you to the doctor if you needed it.	3	2	1
5. Someone who shows you love and affection.	3	2	1
6. Someone to have a good time with.	3	2	1
7. Someone to give you information to help you understand a situation.	3	2	1
8. Someone to confide in or talk about yourself or your problems.	3	2	1
9. Someone who hugs you.	3	2	1
10. Someone to get together with for relaxation.	3	2	1
11. Someone to prepare your meals if you were unable to do it yourself.	3	2	1
12. Someone whose advice you really want.	3	2	1

	None of the time	Some of the time	Most of the time
13. Someone to do things with to help you get your mind off things.	3	2	1
14. Someone to help with daily chores if you were sick.	3	2	1
15. Someone to share your most private worries and fears with.	3	2	1
16. Someone to turn to for suggestions about how to deal with a personal problem.	3	2	1
17. Someone to do something enjoyable with.	3	2	1
18. Someone who understands your problems.	3	2	1
19. Someone to love and make you feel wanted.	3	2	1

SECTION L

Note. Before starting this questionnaire, the principle investigator or research assistant must demonstrate ‘shaking’ a baby doll so that participants understand what is meant by ‘shaking’.

1	**2**	**3**
Disagree	Not Sure	Agree

	Disagree	Not Sure	Agree
1. Shaking a baby is a good way to help a baby stop crying.	1	2	3
2. Shaking a baby for less than five seconds is not harmful to the baby.	1	2	3
3. Sometimes infant crying can be so frustrating or upsetting that I can see how someone might shake a baby.	1	2	3
4. Shaking a baby can be very dangerous and can cause serious injuries.	1	2	3
5. Shaking a baby can kill a baby.	1	2	3
6. If shaking a baby is dangerous, parents should tell other caregivers who look after their baby about the dangers of shaking a baby.	1	2	3

SECTION M

Only if the participant responded YES in Section D, Question 1.

Previously, you mentioned that you have shaken your baby when his/her crying frustrated or upset you – Can you please show me what happened and tell me a little more about this?

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Appendix H

Clinic Introductory Guide

The clinic manager, a nurse, or one of the researchers introduced the research team to all patients at the clinic on a daily basis. This script was used a general guideline and could, therefore, be adapted accordingly. The introduction was given in either English, Afrikaans, or isiXhosa, or a combination of all languages depending on the demographic of participants at each clinic. The style of language was clear and simple, and therefore, easy to understand.

Good morning everyone. I would like to introduce you to Kirsty Nefdt and her research team from the University of Cape Town. They are conducting a research study here at the Well Baby clinic that applies to all mothers with babies younger than one year old.

The study will ask questions about what you do when your baby won't stop crying and how you feel when your baby's crying is upsetting you. This research is important because it might help support mothers like yourselves in the future. They can't interview everybody, so they will approach you about taking part. You do not have to take part, and if you are chosen to participate in this study, you will need to give your permission to the research team. They will discuss this in more detail with you.

If you do choose to take part in this study, you will be required to complete an interview that takes about forty-five minutes with one of the research team members. When you have completed the interview, you will go straight back to your place in the line for your clinic appointment, so you don't need to worry about missing your turn in the line.

Appendix I

Referral Letter for Counselling

UNIVERSITY OF CAPE TOWN

Department of Psychology
University of Cape Town Rondebosch 7701 South Africa
Catherine L. Ward, Ph.D.
Associate Professor
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E-mail: Catherine.Ward@uct.ac.za

18 October 2018

To Whom It May Concern:

REFERRAL LETTER

Thank you for seeing _____. S/he is participating in a research study being conducted by the University of Cape Town which is examining caregivers' relationships with infants.

During her research interview, she disclosed _____

_____

_____

_____

_____

_____

We would be grateful if you could assess her for treatment.

Yours sincerely

Signature Removed

Dr Catherine L. Ward
Associate Professor

Kirsty Nefdt
Project Manager

Appendix J

Qualitative Responses of Infant Shaking

Case	Participant	Response
1.	1.	When I shaked him, he was looking straight in my eyes – thinking what is my mom doing? Then I felt bad and tried to hug him because he wont stop crying. Then I put him on my lap and support him. Before that, I was worried about what is this child going to eat. My husband is the only one working. He was crying, I gave him breast milk, won't stop crying, there wasn't money for pumpkin. Crying was frustrating me. Felt very bad, because that is the baby. Baby can't provide, as a mom you should be able to provide.
2.	3.	Sometimes I do it when I'm so angry because I don't know what he wants. When I feel frustrated.
3.	6.	I would shake her and she would look at me with big eyes and she would cry on. She would cry louder, scream sometimes. I was feeling frustrated cause I'm tired sitting up in the night.
4.	8.	Baby was crying and she shaked baby but not hard because she don't want to hurt baby, just want baby to stop crying.
5.	11.	Sometimes when she is crying, I just check everything, nappy, and I became so angry that I want to cry also because I don't know what is she crying for. That's when I shake her and ask shouting at her what do you want!
6.	25.	If she's sick, now I try to shake him now he doesn't want to stop crying. If I try, the baby need to sleep. I shake. Still crying. Was angry.
7.	32.	It happened at night and I didn't get a lot of sleep. I shook baby on the bed by her arm and told her to stop crying and go to sleep. Picked baby up afterwards.
8.	47.	He's shocked and he starts crying on because it's not pampering him. I was overwhelmed because he was crying and crying, ja. Um, but it's not good to shake the baby, he didn't like to be shaked. Shouted "Stop crying. Levi, stop you naughty".

Case	Participant	Response
9.	48.	Sometimes my baby can cry non-stop and that thing is making me angry and its stress me because he can cry a lot and I become so confused and then I shake him asking what does he want. Also, I can shake my baby just to make him laugh, not hard.
10.	51.	It's like when you shake a baby you are angry, it's like you don't know that you are hurting a baby, it's not good. I don't feel anything, I just do it, when I try everything and nothing work. It doesn't mean anything, the baby doesn't stop crying, it just cries more.
11.	52.	Most of the time when I feel frustrated or angry I give baby to father or go for a walk so I can cool down. Sometimes I just pray please God just keep me calm. I need to calm down. Yesterday, baby didn't want to sit down. Feeling frustrated because I was busy and she didn't want to sit, "Why don't you want to sit"!. Then I shake her.
12.	69.	I shake my baby when I'm angry at him, because there are times when he can cry without stopping and I have done everything that I needed to do but he will keep on crying. That's when I shake him especially at nights he likes to cry while I want to sleep.
13.	76.	I shake my baby when he is crying a lot, because sometimes I feel confused about why he's crying for.
14.	98.	I shake my baby sometimes when I'm angry with him because of the crying. He likes to cry a lot so I became angry – and shake him because I want him to stop.
15.	99.	When my baby cries a lot sometimes I feel like I can shake him; because he make me feel angry and frustrated.
16.	101.	He was crying and I shouted at him – maybe I am busy, and then I stress. "Stop, don't do that!"
17.	103.	I only shake him – I feel guilty after I shake him. I shake him sometimes. She's crying so I don't know if she's sick or what.
18.	105.	When I'm shaking baby he stops crying. When he's crying, then I shake him.

Case	Participant	Response
19.	125.	I shake my baby when I'm upset just to make her stop crying, sometimes I have feed her, bath her, and even play with her but she will keep on crying – that's when I become angry on her.
20.	139.	I do shake my baby when she is crying a lot, at that moment I'm confused what she wants – and I become angry on her and I start shaking and asking what do you want! I feel that when I'm shaking her she will stop crying, and it does help me because when she saw that I'm angry on her she will stop immediately.
21.	142.	When I'm tired and don't know what to do.
22.	164.	I shake my baby when I'm angry sometimes when she's crying for nothing, and I get angry and shake her.
23.	174.	Sometimes when I'm stressing about something and my baby is crying all the time I become angry and shake her because I don't know what she wants at that time.
24.	176.	I shake my baby when I'm angry sometimes. I have bath him, breastfeed him, but he will keep on crying that's why I become angry and shake him.
25.	179.	When I'm cross ne, when I'm frustrated or angry, then I take it out on my child. But I'm thinking I mustn't do that, it's wrong it's not his problem. Afterwards, thinking it's not right – can't do it with him.
26.	181.	Because sometimes he was crying, but I'm feeling worried then I do that. But not most of the time, only sometimes. Feeling angry. Sometimes he's crying and he wants to eat porridge and he's crying too much.
27.	206.	I shake my baby when I'm angry when he is crying for something that I don't know. I became confused and stressed.
28.	225.	She vomits and cry's a lot when I shake her when I'm angry. When she start crying and I don't know why. And she don't want to take my breast, then I shake her.
29.	239.	I shake him to make him quiet when he's crying a lot but I don't shake him hard.
30.	251.	No response, but admitted to shaking.

Case	Participant	Response
31.	258.	I shake my baby when I'm stressed and angry because there are times that he can cry on and on without stopping and I don't know what he wants at that time and become angry on him.
32.	261.	Just when he's crying non stop, so I don't know what to do next – I'm not feeling cross, I'm just cross when he doesn't want to stop crying. Only I'm cross with him – it's happened only a few times.
33.	263.	Now he was just crying cause he was teething and had injection – mom went to church, I thought ooh, I gave him bottle, fed him, bathed him, changed diaper, did everything, now thinking of what to do. Baby sitting on my lap, hold by shoulders "Stooop… don't cry" [Mom grits teeth]. Just frustrated cause I don't know what to do and I've done everything I'm supposed to do.
34.	268.	I shake my baby when I'm frustrated and angry, because at that time I have bath her, feed her, but she will keep on crying that's why I got angry and shake her because I don't know what she wants. I become confused.
35.	277.	When she was starting to cry (at night I came home late with her), I can't walk around the community. Crying, crying, crying, left her, rather ask why – said I don't know, put stuff on her teeth. Because I walked late with her, that's why I think she was crying [shows me shaking] – I was cross when I shaked her.
36.	278.	I feel like tired, nothing else, I'm just tired of doing this now. Feeling frustrated. Made baby's crying worse.
37.	282.	That time I was depressed because I had argument with father – so I came home and baby was crying, and I just didn't know what to do. Baby's crying got worse – so I gave him to my mom and I took him for a walk.
38.	284.	Sometimes I have my personal problems. I'm stressing with something then he cries a lot, that's when I shake him and ask what does he want. Because I have breastfeed him and bath him but he will keep on crying, then I got angry.

Case	Participant	Response
39.	299.	Sometimes when he cries a lot, then have to shake him then he sleeps (used to do it when he not want to drink milk) – he would cry more. [My note: I think her first shaking was misunderstanding it – even though I showed her with the doll numerous times. Her shaking was more a gentle shaking. Then I asked her "have you ever been so angry at baby and shaken her like this" – demonstrated, and she said yes… used to do it.]
40.	303.	I shake my baby when she is crying non-stop because that stresses me when she's crying for nothing.
41.	305.	I shake my baby when I'm angry because sometimes he cries a lot and I become bored and confused about what does he wants.
42.	317.	I shake my baby when I'm angry on him because there are times that he can cry without stopping and I became frustrated and angry that's why I shake him.
43.	318.	Shaken twice.
44.	337.	Although she said she has never shaken her baby, when I asked the initial question in 1D, "have you shaken your baby before" – she said "what do you mean, shake him like this?" – she then proceeded to hold baby as baby was sitting on her lap, and demonstrated shaking him – this was rough for such a small child, she only did it for +- 1 second, but baby was visibly disturbed for a few seconds – started to cry more, but then she calmed him. When, after, she demonstrated this shaking, she said "No, I don't shake him like this", but she seemed very comfortable to demonstrate this in quite a "normal" manner. When she shook her baby, the child's neck visibly went in a whiplash forward and backward motion. It didn't add up that she demonstrated this shaking so well yet insisted that "No", she didn't do this.
45.	353.	I just shake her when I want her to be quiet but not hard.
46.	366.	She will shake her baby when she is angry. [She showed me what she does].

Case	Participant	Response
47.	371.	I feel confused when she is crying a lot and sometimes become angry and shake her hand.
48.	373.	I shake my baby when he is crying a non stop, sometimes I'm stressing about something and I just shake him so that he can stop.
49.	374.	Sometimes when he cries a lot and I don't know what to do – I just shake him. That's mostly when he cries.
50.	376.	I feel everything disappear if I shake him when I'm cross. I just do this "Stop crying" [Shakes, shows me, mother looks angry, dolls neck bounces back and forth]. Sometimes he cry too much. Then I put him down, and sit next to him – he gonna stop crying if I ignore him.
51.	398.	Didn't want to complete.

Appendix K

Histograms of Dependent Variables

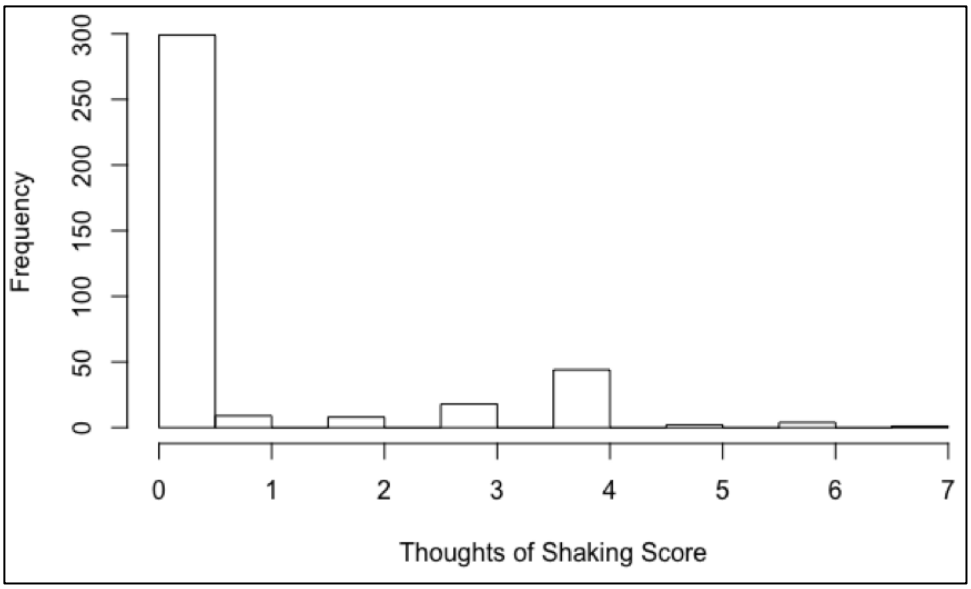

Figure 1. Dependent variable histogram: Thoughts of shaking

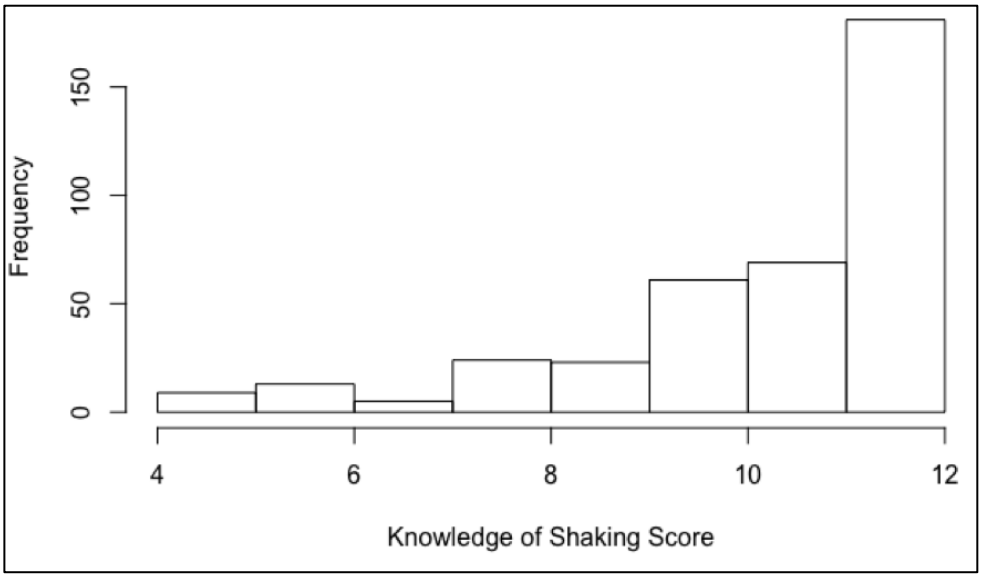

Figure 2. Dependent variable histogram: Knowledge of the dangers of shaking

Appendix L

Model Residual Plots for Dependent Variables

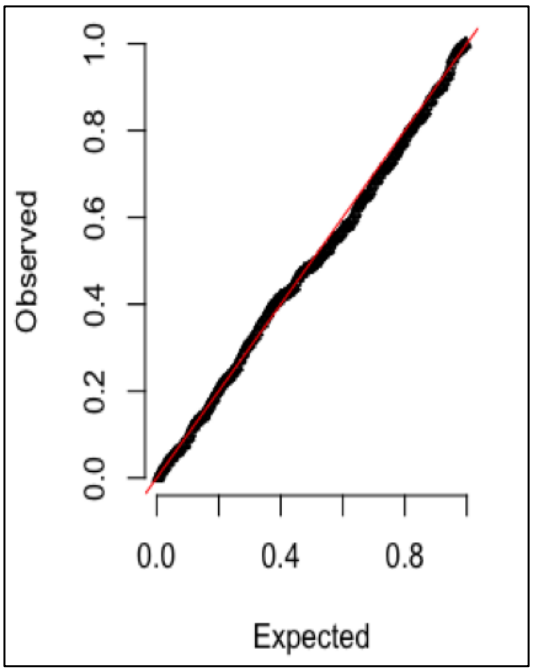

Figure 3. Model 4 (Dependent variable: Shaking)

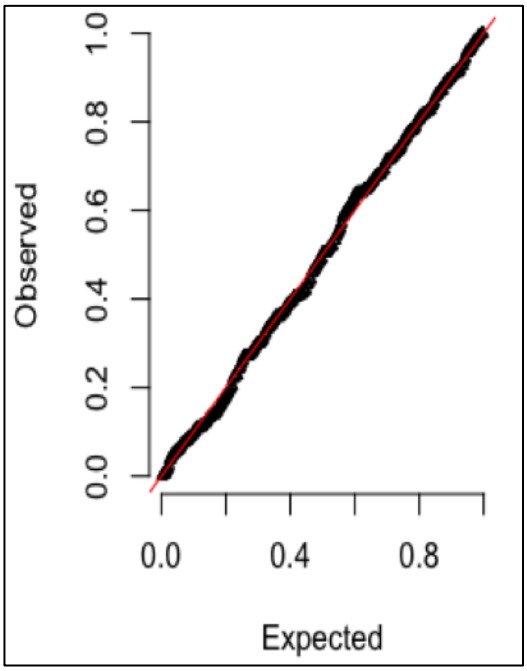

Figure 4. Model 5 (Dependent variable: Shaking)

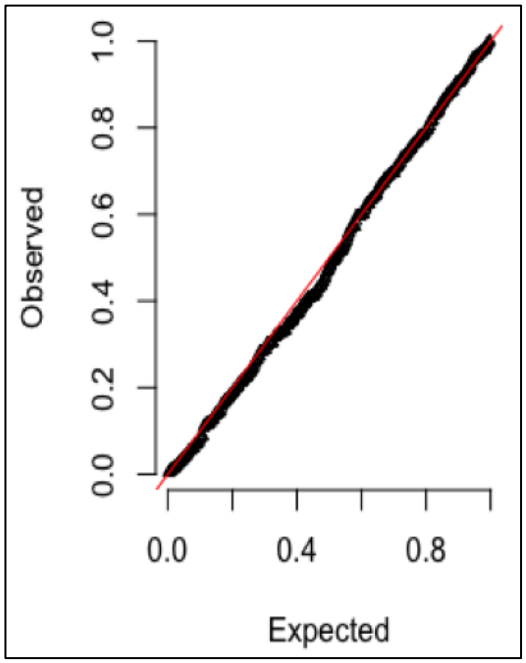

Figure 5. Model 4 (Dependent variable: Thoughts of shaking)

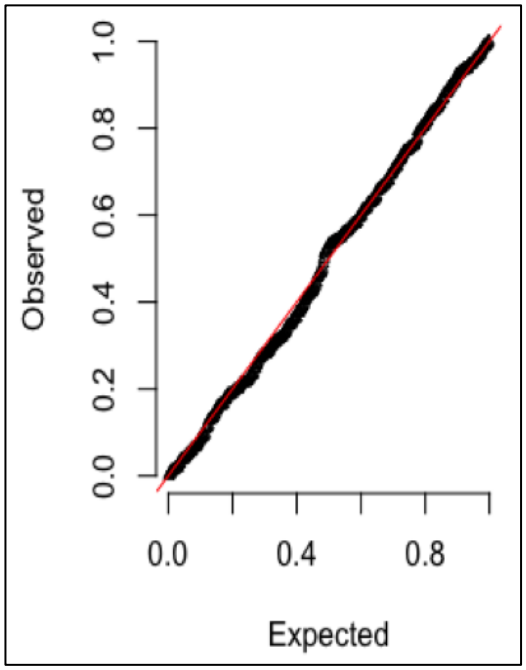

Figure 6. Model 4 (Dependent variable: Knowledge of the dangers of shaking)