

# Is a School Based Educational Program Effective in Changing Knowledge Regarding the Prevention of Shaken Baby Syndrome?

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IS A SCHOOL-BASED EDUCATIONAL PROGRAM EFFECTIVE IN CHANGING  
KNOWLEDGE REGARDING THE PREVENTION OF  
SHAKEN BABY SYNDROME?

by

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ABSTRACT  
IS A SCHOOL-BASED EDUCATIONAL PROGRAM EFFECTIVE IN CHANGING  
KNOWLEDGE REGARDING THE PREVENTION OF  
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Margaret K. Stelzel, R.N., M.S.N.

Marquette University, 2009

Shaken baby syndrome (SBS) involves physiological and neuropsychological sequelae secondary to parental or caregiver handling of an infant or young child (Goldberg & Goldberg, 2002). According to the American Academy of Pediatrics (APA) (2001), non-accidental head injuries are the leading cause of traumatic death and cause of child abuse fatalities. The prognosis is extremely poor with a death rate of 26-36% and up to 78% of the survivors suffer long-term disability (Barlow & Minns, 2000). According to Prevent Violence Against Children Act, 2005 Wisconsin Act 165; SECTION 7.121.02(1)(L)6 educational SBS requirements are mandated, effective school year 2007-2008. Two instrument development studies were completed to examine reliability and validity of the USBS-13 instrument. Tenth grade students (N=260) were randomly assigned by classroom to intervention and control groups. The intervention included a 50 minute interactive class with a SBS Simulator™ developed by Realityworks® (2009). The intervention group had significantly higher knowledge on post-test compared with the control group (p=.000). The intervention was found to be equally effective with males, which is of importance, since they are more often the perpetrator in SBS (Lazoritz, Baldwin & Kinney, 1997; National Center on Shaken Baby Syndrome, 2009).

## DEDICATION

Margaret K. Stelzel, R.N., M.S.N.

I dedicate this research to McKenzie Lee and Hunter Dane Rehm. They are the bravest and most incredible people I have ever known. I am proud to call you my children.

## ACKNOWLEDGEMENTS

Margaret K. Stelzel, R.N., M.S.N.

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## **Chapter 1: Introduction: Scope of the Problem**

### **Shaken Baby Syndrome**

The purpose of this research was to examine whether or not a school-based intervention increased knowledge in the prevention of shaken baby syndrome. In this chapter the historical background of SBS, previous clinical and experimental research regarding its incidence, causation, sequelae and outcomes, risk factors, cost, and need for prevention will be discussed. Current legislation and the lack of prevention research will also be detailed and how this led to the research question.

#### **Historical background.**

In 1974 Dr. John Caffey first used the term “whiplash-shaken infant syndrome to describe the association between intracranial injuries, retinal hemorrhage (RH), and certain long bone fractures attributable to child abuse among infants” (Dias, Smith, DeGuehery, Mazur, Li & Shaffer, 2005, p. 471). Other terms that have been used include shaken infant or impact syndrome, infant shaken impact syndrome, infant whiplash-shake injury syndrome, abusive head trauma, inflicted, non-accidental, or intentional head injury (Dias et al., 2005). However, shaken baby syndrome is the most widely used and recognized term (Dias et al., 2005). “Whatever the terminology and pathogenesis, abusive head injuries among infants represent one of the most severe forms of child abuse with a 13 to 30% mortality rate” (Dias et al., 2005, p. 471) and significant neurologic impairments in at least one half of those who survive (Ludwig & Warman, 1984).

Historically, subdural hematomas (SH) were attributed to the deformation of the skull during birth, until 1946 when John Caffey first made the association between SH and fractures of the long bones. Rising awareness of the scope and scale of child abuse

initially met significant opposition, as at that time many child experts believed that parents would not injure their own children (Lazoritz, Baldwin & Kini, 1997).

Later, in 1962, Kempe, Silverman, Steele, Droegemueller and Silver defined a new syndrome described as the Battered-Child Syndrome which combined evidence of any bone fracture accompanied with SH, or when the degree and type of injury was inconsistent with the history given. Subsequently, they emphasized the possibility of pathological violence by parents or caregivers towards the child and put the obligation of questioning caregivers to gain a factual history, accurately diagnose children and initiate appropriate child protective measures back onto the physician (Kempe et al., 1962).

In 1971, Guthkelch was perhaps the first to expose the unusually high incidence of SH occurring in battered children compared to head injuries of other origin. He compared injuries caused by severe whiplash by way of a motor vehicle accident (MVA) with no head impact to many cases of the battered child syndrome (Guthkelch, 1971). He remarked that it was felt to be more socially acceptable to shake a child and physically less dangerous than actually hitting a child (Guthkelch, 1971). Three years later, Caffey (1974) was the first to recommend that it was essential to educate parents, caregivers and physicians to the dangers of shaking infants, which had previously been considered harmless.

Caffey (1972 & 1974) and Guthkelch's (1971) research was fundamental to the start of SBS research and provided evidence from many previously reported cases of SH, RH and long bones fractures where there was no evidence of external head trauma or acknowledgment suggesting shaking. During this same time frame, Dr. Caffey (1974) pointed out one of the most prominent cases known was printed in Newsweek in 1956,

where a nurse had shaken several babies within a nine year period of time to the point of death and or disability. He indicated that this was largely due to the absence of external physical signs of trauma after the shaking (Caffey, 1974).

### **Incidence and causation.**

Observable incidences of shaking have been rare, leaving the occurrence not precisely known (Barlow & Minns, 2000). The incidence is estimated from the numbers of subdural hematoma (Barlow & Minns, 2000). There is a national incidence of 750 to 3,750 cases of SBS per year (NCSBS, 2009). In the State of Wisconsin it is known that about 60 babies are shaken each year (personal communication, Lynn Sheets, M.D., May 4, 2009).

Despite these seemingly low numbers, in 1991 the U.S. Advisory Board on Child Abuse and Neglect determined that SBS accounted for 55% of all abused children and inflicted head trauma was determined to be the leading cause of death in children less than one year of age. Fifteen to 38% of these children had died and those that survived had a high rate of morbidity (U.S. Advisory Board on Child Abuse and Neglect, 1991).

Ten years later, the American Academy of Pediatrics (AAP) Committee on Child Abuse and Neglect (2001) indicated that 95% of intracranial injuries and 64% of all head injuries in infants continue to be attributable to child abuse. All of these children were younger than one year old, in addition, 80% were also less than two years old (AAP, 2001). The AAP (2001) concluded that head injuries are the leading cause of traumatic death and the leading cause of child abuse fatalities.

A number of studies document injuries associated with SBS and its incidence (Alexander, Sato, Smith & Bennett, 1990; Barlow & Minns, 2000; Becker, Liersch,



Tautz, Schlueter & Andler, 1998; Brown & Minns, 1993; DiScala, Sege, Li & Reece, 2000; Gilliland & Folberg, 1996; Hadley, Sonntag, Rekate & Murphy, 1989; Jayawant, Rawlinson, Gibbon, Price, Schulte, Sharples et al., 1998; Lazoritz et al., 1997; Maxeiner, 2001; McClelland, Rekate, Kaufman & Persse, 1980; Morris, Smith, Cressman & Ancheta, 1993; Smith, Hanson & Noble 1974; Tzioumi & Oates, 1998). See Appendix A for a summary of the specific SBS incident related studies. Related to incidence and age, a database covering the years 1988 to 1997 was reviewed by DiScala et al., (2000). They examined 1,997 cases of abuse and 16,831 unintentionally injured children under the age of five. The median age for the non-accidentally injured children was eight months compared to the accidental injury median age of 28 months (DiScala et al., 2000). The abused children also had previously been seen for other medical issues 53% of the time compared to only 14.1% of the accidentally injured children (DiScala et al., 2000).

#### **Injury sequelae and outcomes.**

Shaken baby syndrome is a form of child abuse that occurs when a child is subjected to rapid acceleration, deceleration and rotational forces, with or without impact (King, MacKay, Sirnick & The Canadian Shaken Baby Study Group, 2003). This results in a unique constellation of intracranial, intraocular, and cervical spinal cord injuries (King et al., 2003).

“Movement of the brain within the subdural space causes stretching and tearing of the bridging veins, which extend from the cortex to the dural venous sinus” (Marincek & Dondelinger, 2007, p. 109). The loss of blood, typically two to 15 ml, into the subdural space is not in and of itself harmful (Blumenthal, 2002). However, it provides firm

evidence of shaking in the absence of a history to explain it (S. Lazoritz, M.D. & R. Reece, M.D., personal communication, October 17, 1999).

As described by Geddes and Plunkett (2004) the initial brain injury caused by shaking is hypoxia. This in turn causes cerebral edema or swelling and raised intracranial pressure (Blumenthal, 2002). As a consequence, further neurological damage or death ensues (Blumenthal, 2002).

Skeletal injuries associated with subdural hemorrhages have been well described in the literature (Lazoritz et al., 1997). Squeezing the chest as the child is gripped causes posterior rib fractures and the child hitting inanimate objects within the immediate environment commonly causes long bone fractures (Blumenthal, 2002). Sternum fractures have been caused by the face of the baby slamming onto its own chest (NCSBS, 2009; W. Perloff, M.D., personal communication, August 29, 1998). The classic eye sign of inflicted head injury is retinal hemorrhage, either unilateral or bilateral, which rarely occurs even in severe accidents (Blumenthal, 2002; Kivlin, 1999; Levin, 1990, 2003).

The constellation of these injuries does not occur with short falls, seizures, or as a consequence of vaccination (AAP, 2001) and the outcome of SBS is often permanent. Those that survive exhibit a variety of disabilities which include motor disabilities, partial or complete loss of vision, hearing impairments, hydrocephaly, mild to severe retardation, seizure disorders, cerebral palsy, sucking and swallowing disorders, developmental disabilities, autism, language and cognitive impairments, behavior problems, and some remain in a permanent vegetative state (Lo, McPhillips, Minns, & Gibson, 2003).

Even when a baby looks normal immediately after the shaking, he or she may eventually develop problems (Showers, 1997). Sometimes it is not noticed until the child begins school and exhibits behavioral or learning difficulties (Showers, 1997). Children who have been shaken have been shown to have lower IQ scores, poor verbal processing, and less social behaviors than their same-age peers (Goldberg & Goldberg, 2002). However, it is more difficult to link these problems to a shaking incident that took place years before. While data on outcomes are limited, fewer than 10 to 15% of shaken babies are believed to recover completely (Showers, 1997).

### **Risk factors.**

Babies are particularly vulnerable to head injury for several reasons. The skull of a young child is thin and pliable due to the lack of bone fusion and open fontanelles (NCSBS, 2009). As a baby's brain grows, it reaches 75% of its full weight by the age of two, although it remains developmentally immature (Case, Graham, Handy, Jentzen & Monteleone, 2001). This makes an infant's head approximately 10 to 15% of its total body weight, compared to 2 to 3% for an adult (Case et al., 2001).

One of the greatest protections against any head injury is the ability to keep the head stationary in response to impact or movement (Case et al., 2001). The neck muscles of the young child are undeveloped and do not adequately support the weight of the head (Case et al., 2001), making an infant's brain more vulnerable when shaken (Lazoritz et al., 1997).

The brain is surrounded by cerebral spinal fluid (CSF), however, in a baby it is up to 10 mL thick compared to only one to 2 mL in older children and adults (Case et al., 2001). With this extra room, when a child is shaken, the head of the child oscillates back

and forth which can create significant movement of the brain within the skull (Lazoritz et al., 1997).

Although SBS is occasionally seen in children up to four years old, the vast majority of incidents occur in infants who are younger than one year of age (Case et al., 2001). The average age of victims is between three and eight months (DiScala et al., 2000). Approximately 60% of shaken baby victims are male and 40% are female (DiScala et al., 2000).

Shaken baby abuse is not limited to any special group of people. However, 60 to 95% of the time males tend to be the perpetrators (Dias et al., 2005; Honig, Fitzgerald & Brophy-Herb, 2001; Lazoritz & Palusci, 2001; Showers, 1997). Female perpetrators are more likely to be baby-sitters or childcare providers than mothers (Dias et al., 2005; Honig et al., 2001; Lazoritz & Palusci, 2001; Showers, 1997). Nevertheless, intrafamily shakings account for up to 60 to 76.5% of all shakings (Lazoritz & Palusci, 2001). Crying is cited as the most common reason why the shaking occurs and given that all babies communicate by way of crying, we can assume that all babies are at risk (Dias et al., 2005).

### **Cost.**

Initial inpatient hospitalization costs an average of \$18,000 to \$70,000 per child, and average ongoing medical costs can exceed \$300,000 per child (Dias et al., 2005). Many children require long-term medical services, physical, occupational, speech, and educational therapies, as well as lifelong custodial care (Dias et al., 2005). Showers indicated in a 1997 study that long-term management costs can exceed \$1 million per child.

While the direct costs are tremendous, the indirect costs to a survivor, the parents, caregivers, siblings, extended families and the communities in which they live are significant but hidden. The costs linked with loss of societal productivity and occupational revenue in addition to prosecution and incarceration of a perpetrator are unknown.

The average cost to house a single prisoner in the United States is estimated to be \$30,000 per year (U.S. Department of Justice, 2007). Shaken baby syndrome is considered a form of child abuse and those convicted are likely to become incarcerated. In the State of Wisconsin, 18 years of imprisonment is the maximum sentence given (Zoom Info, 2009). Using this as an example, with an estimated cost of \$30,000 per year per inmate, one perpetrator could cost Wisconsin up to \$600,000 over the course of the sentence. It is therefore conceivable if all persons were convicted after shaking a baby in the State of Wisconsin, it could cost 1.8 million dollars yearly to house newly convicted perpetrators (60 perpetrators times \$30,000 per year). This does not include continued yearly costs for those already incarcerated.

There are clear mental health issues related to the aftermath of SBS for those surviving parents, siblings, extended families and to those children who survive (Showers, 1997). The actual cost is unknown, but these services are not only necessary acutely, but are often needed for years after the shaking (Showers, 1997).

Child abuse may also extend into the workplace. Those who are grieving may have concentration and memory problems and their work performance may be affected, sometimes permanently. If someone is having difficulty coping with grief or stress, they

are typically encouraged and often required to contact their employee assistance program. This may initially be a free service to the employee, but is not free to the employer.

Approximately 70% of shaken baby victims' parents divorce after the incident (W. Perloff, personal communication, September 21, 2000). Marriages may be particularly strained when the perpetrator is not completely known. For those families who have surviving siblings, the conflict between parents can be destructive and may have lifelong effects (W. Perloff, personal communication, September 21, 2000).

The economic ramifications of SBS to society reach all of us in more ways than we know or understand. "An effective prevention campaign could potentially save the lives of many children and improve the lives of many others" (Dias et al., 2005, p. 473). "The costs of such a campaign could be recovered from the economic savings to society while reducing the incidence" (Dias et al., 2005, p. 473).

#### **Need for prevention.**

Shaken baby syndrome has received much media attention due to several high profile cases in the last two decades. Yet, despite the severity of the injuries and enormous societal costs, studies continue to suggest that 25 to 50% of people still have not received information about this problem (Lazoritz & Palusci, 2001; Showers, 1989, 1990, 1992). Accordingly, prevention efforts need to be developed and tested for effectiveness.

No studies to date have examined effectiveness of a prevention program for adolescents. However, one hospital based prevention program had significant results in 1998 related to a parent education campaign and concluded that a hospital-based, parent

education program can significantly reduce the incidence of abusive head injuries (Dias et al., 2005).

According to the American Red Cross (2007), up to 60% of high school and middle school students are currently babysitting, with a significant number babysitting for young children, including babies and infants. There have been instances where teenage babysitters were accused of shaking children (Lazoritz & Palusci, 2001). Yet, not all babysitter classes educate students about shaking injuries or train students to cope with persistent crying. This is perhaps in part due to the lack of mandating law.

According to Dias et al., (2005), the role of prevention may not be to educate the general public, but to remind the right people at the right time. For that reason it is crucial that education regarding SBS be presented to all middle and high school students to either serve as a primary prevention initiative or as a reminder to previous knowledge. This information may not only be for their immediate use, but for future reference as they become caregivers and parents. The findings of this research underscore the need to implement a school-based primary SBS prevention program.

### ***Legislation.***

On August 6, 2001, New York passed the first law relating to SBS education in a hospital setting. Wisconsin, Nebraska, Missouri, Illinois, Ohio, South Carolina, Massachusetts, Minnesota and Pennsylvania joined New York in implementing a hospital based SBS prevention program based on the Dias et al., (2005) research. Similar legislation is pending in Rhode Island, New Jersey and Iowa. Statutory parental education requirements are also in California, Texas, Florida, Indiana, Virginia, Tennessee and Washington. In 2008, California, Washington, Wisconsin, Illinois,

Florida, Texas, Maryland and Nebraska joined New York in adopting legislative resolutions or proclamations designating a statewide SBS Awareness Week.

However, Wisconsin is the only State to mandate a school-based educational program to prevent SBS. Given that no studies have been identified which examined the effectiveness of a school-based program to increase knowledge regarding SBS prevention, this initial research serves to address this need.

***Lack of research.***

Shaken baby syndrome prevention research were found in only two studies (Dias et al., 2005; Barr, Barr, Fujiwara, Conway, Catherine & Brant, 2009). The participants were adults, but both studies had positive results. However, Fulton (2000) reported the focus of education should be on childcare providers and potential childcare givers. This would include millions of the middle and high school students who are currently childcare givers (Fulton, 2000). Dziegielweski, Richards and Diebolt (2004) agreed with Fulton (2000) that incorporating education about SBS within the school system will reach many young actual and potential childcare givers and will subsequently decrease mortality and morbidity rates associated with SBS.

Additional work is clearly needed to identify vulnerable children, develop and evaluate prevention strategies (King et al., 2003). The NCSBS (2009) clearly supports this by indicating that while the consequences of SBS are terrible, it is 100% preventable through education.

**Need and Purpose for Research**

Shaken baby syndrome is only one example of child abuse, yet is a leading cause of morbidity and mortality in infants (Wyszynski, 1999). As earlier stated, the AAP



(2001) estimates nearly 25-50% of the public is not aware of the dangers of shaking a baby. Yet leading researchers agree that SBS is preventable through primary education programs (AAP, 2001; Barlow, Milne, Aitken & Minns, 1998; Barlow & Minns, 2000; Blumenthal, 2002; Chadwick, 1984; Dias et al., 2005; Jenny, Hymel, Ritzen, Reinert & Hay, 1999; Kirschner & Stein, 1985; Lazoritz & Palusci, 2001; Levin, 2003; Reece, 2004; Showers, 1992, 1994 & 1997).

Over the past decade mandated education has been legally required in several states, yet these prevention efforts have not included formal research related to the effectiveness of a school-based program in changing knowledge for the prevention of SBS. The specific purpose of this research is to determine this effectiveness with the hope that it will provide groundwork for further examination.

### **Research Question Selection**

Wisconsin's Governor Doyle signed shaken baby syndrome prevention legislation, sponsored by State Senator Julie Lassa on March 21, 2006. Educational SBS requirements were mandated effective school year 2007-2008 according to the Prevent Violence Against Children Act, 2005 Wisconsin Act 165; SECTION 7.121.02(1)(L)6.

It is critical that the available curricula result in increased student knowledge regarding the prevention of SBS. This serves as the foundation for the research question selection: Is a school-based educational program effective in increasing knowledge regarding the prevention of SBS?

### **Summary**

Shaken baby syndrome is devastating on all levels and is perpetual for those it touches. The injuries are felt long after the shaking and extend deeply into the physical

and emotional life of all those who know the child. Prevention is our only hope to rid the world of SBS. But in order to justify further expenditures on prevention, we must first examine whether or not an intervention, such as that examined in this research, is effective. This research was specifically designed to examine whether or not a school-based educational program is effective in changing knowledge regarding the prevention of SBS and serves as an initial step in those efforts.

## **Chapter 2: Review of the Literature**

### **Overview**

In this chapter the theoretical basis underlying this research will be reviewed along with studies pertinent to preventing SBS. A number of theories underpin the assumptions and the Realityworks® (2009) intervention examined in this study. These will first be described followed by a review of pertinent studies. Theories pertinent to the prevention of SBS with a school-based intervention include: Pender's Health Promotion Model, knowledge acquisition theories, developmental theories, and other health behavior change theories

### **Health Promotion Model**

A number of the assumptions of Pender's Health Promotion Model (HPM) underpin this research. The HPM assumptions are as follows: "that persons have the capacity for reflective self-awareness, including assessment of their own competencies; individuals seek to actively regulate their own behavior, health professionals constitute a part of the interpersonal environment, which exerts influence on persons throughout their lifespan, and self-initiated reconfiguration of person-environment interactive patterns is essential to behavior change" (Pender, 1996, p. 54-55).

The theoretical statements of the HPM provide a basis for research related to health behaviors. Pender, Murdaugh and Parsons (2002), theorized that persons are more likely to commit to and engage in health-promoting behaviors when significant others model the behavior, expect the behavior to occur, and provide assistance and support to enable the behavior. They further stated that families, peers, and health care providers are important sources of interpersonal influence that can increase or decrease

commitment to and engagement in health-promoting behavior; and that situational influences in the external environment can increase or decrease commitment to or participation in health-promoting behavior (Pender et al., 2002). See Appendix B for the assumptions and theoretical propositions of the HPM and reproduction permission.

Specific to this research, Pender (1996) detailed a commitment to an action plan which the participants in this research were asked to acknowledge. She indicated in order to carry out a specific action plan “at a given time and place with specified persons or alone the cognitive processes need to be in place” (Pender, 1996, p. 72). Since 25-50% of people are estimated not to know about SBS, a fundamental cognitive process necessary to prevent SBS is the acquisition of knowledge. The action plan can then be carried out in the future.

### **Health promotion model research.**

Most of the research utilizing Penders’ HPM has been conducted with adult subjects. Research with adolescents has limited representation. A search limiting Pender’s HPM to adolescents revealed fifteen studies (Allen, Taylor & Kuiper, 2007; Ammouri, Harsohena, Neuberger, Gajewski & Choi, 2004; Baker, 2003; Barrett, Dunkin & Shelton, 2001; Callaghan, 2005 & 2006; Calvert & Bucholz, 2008; Chandanasotthi, 2003; Chen, James, Hsu, Chang, Huang & Wang, 2005; Deenan, 2003; Morowatisharifabad & Shirazi, 2007; Phuphaibul, Thanooruk, Leucha, Sirapo-Ngam & Kanobdee, 2005; Sapp, 2003; Wang, Wang, Tung & Peng, 2007; Warner, 2000). Seven of them were school-based (Callaghan, 2005 & 2006; Chandanasotthi, 2003; Morowatisharifabad & Shirazi, 2007; Phuphaibul et al., 2005; Wang et al., 2007; Warner, 2000), two of those seven utilized Bandura’s (1997) Social Cognitive Theory (Callaghan,

2005 & 2006) and three of the studies also used Orem's (1995, 2001) Self Care Deficit Theory (Callaghan, 2005 & 2006; Chen et al., 2005). None focused on knowledge change to prevent SBS. See Appendix C for a table of these 15 HPM based studies.

### **Theoretical Perspectives on Knowing, Learning and Child Development**

Knowledge change cannot be thoroughly examined without exploring major learning theories. Learning theories describe how people learn and assist us in understanding this complex process (Driscoll, 2000). There are three main perspectives: behaviorism, cognitivism, and constructivism.

Behaviorism denotes that learning is the result of operant conditioning. A behavior increases when there is reinforcement and when there is punishment the same behavior decreases in reoccurring (Watson, 1913). Cognitivism is not a refutation of behaviorism, but rather it focuses on the inner activities of the mind where the role of memory is emphasized on how it plays on information retrieval and its use (Mithaug, Mithaug, Agran, Martin & Wehmeyer, 2003). Constructivism views learning as a process where one constructs or builds new ideas based upon current and past knowledge and experiences (Willis, 2008). Through this view the teacher "acts as a facilitator to the student to construct knowledge and to solve realistic problems" (West-Burnham & Coates, 2005, p. 73).

Child development was also taken into consideration in exploring the effectiveness of a school-based intervention program. Three major theories of child development were explored: Bandura (1997), Piaget (1967), and Bronfenbrenner (1979). Piaget's (1967) theory provides the most important foundation for offering SBS prevention education in middle and high school.

Jean Piaget (1896-1980) was a Swiss philosopher and developmental theorist who believed that everyone moved through a series of four distinctive stages with some cross over in the ages in which each child achieves each stage (Piaget, 1967). Each stage has cognitive tasks which must be accomplished before going into the next stage (Piaget, 1967). Piaget (1967) believed that the learner must be an active participant and that knowledge must be constructed by the learner and not just communicated. He asserted that the mind organizes this knowledge to act upon later (Beck, 2004).

The participants in this research were adolescents who, according to Piaget (1967), are in the formal operational stage and are intellectually ready to learn. In this stage Piaget (1967) indicates the adolescent is able to imagine the future and possible ways of dealing with hypothetical situations vs. the younger child who is not able to think abstractly.

### **Knowledge Change Studies in Adolescents**

“One of the most compelling arguments for a focus on adolescent health and knowledge change is that it is a time when new health behaviors are laid down that influence health throughout life” (Viner & Mcfarlane, 2005, p. 527). A review of the literature revealed 11 studies specifically related to knowledge change which met the search criteria of an adolescent school-based interventional study (Barnet & Hurst, 2003; Fowler, 1991; Kinsler, Sneed, Morisky & Ang, 2004; Kristjansson, Helgason, Mansson-Brahme, Widlung-Ivarson & Ullen, 2003; Ma, Lan, Edwards, Shive & Chau, 2004; McBride & Farrington, 2000; McBride, Midford, Farrington & Phillips, 2000; Ostfeld, Esposito, Straw, Burgos & Hegyi, 2005; Portzky & van Herringen, 1996; Robinson, Vander Weg, Riedel, Klesges & McLain-Allen, 2003; Sussman, Dent, Craig, Ritt-Olsen

& McCuller, 2002). No studies were found regarding knowledge change, SBS and adolescents.

One study related to knowledge change regarding SBS was recently published by Barr et al., (2009). This study examined the educational materials from the PURPLE Crying program to determine if knowledge change and behavior change occur. The researchers concluded that those who received the educational materials had higher scores for knowledge change about crying and a higher rate of behavior change specific to “walking away from inconsolable crying” (Barr et al., 2009, p. 732).

The Barr et al., (2009) research was conducted in a hospital setting with adults rather than with adolescents; yet all those who encounter infants do not participate in hospital based programs. Additionally, given that males are the most frequent SBS perpetrator and are under represented in these programs (Lazoritz et al., 1997), high school may be the last time they encounter such prevention education efforts.

Since no SBS prevention studies were found with adolescents, studies in which knowledge change regarding other topics were examined and will be briefly reviewed. Barnett and Hurst (2003) summarized an evaluation of an abstinence only sexuality education program. This program used an infant simulator that offered a practical view of parenting (Barnett & Hurst, 2003). The infant simulator was made by the same company who developed the curriculum used in this research. This study supports the use of the infant simulator and its use in knowledge change.

Ostfeld et al., (2005) studied an inner-city school-based program that was intended to promote early awareness of risk factors for sudden infant death syndrome (SIDS). Students who received the program demonstrated increased knowledge

compared with a cross-section of students from the same grades and schools (Ostfeld et al., 2005).

The remaining studies found positive effects on knowledge change (Fowler, 1991; Kinsler et al., 2004; Kristjansson et al., 2003; Ma et al., 2004; McBride et al., 2000; McBride & Farrington, 2000; Portzky & van Heringen, 1996; Robinson et al., 2003; Sussman et al., 2002; Wan & Bateman, 2007). Only one of those studies had any bearing on future behavior and this was only mild (McBride & Farrington, 2000). Thus, the above cited studies produce the question: If knowledge change occurs does it serve as a basis for behavior change? See Appendix D for a table outlining the details of the adolescent knowledge change studies.

### **Behavior Change Theories**

The complex process of behavior change was examined in order to explore the question of knowledge change as a basis for behavior change. The most commonly cited theories extrapolated from a review of the literature regarding behavioral change studies are: The Social Learning Theory, Theory of Reasoned Action, and the Stages of Change or Transtheoretical Model.

In 1969, Albert Bandura developed his Social Learning Theory, also known as Social Cognitive Theory, where behavior change is influenced by environmental and personal factors. He also proposed that an individual's thoughts affect behavior and an individual's characteristics elicit certain responses from the environment (Bandura, 1969). According to this theory, SBS prevention education would therefore affect a person's thought patterns and subsequently their behavior.



The Theory of Reasoned Action assumes that a person first considers the consequences before performing the behavior and intention is a central factor in determining behavior and how it is changed (Ajzen, 1988). According to Ajzen (1988), the behavior or behavioral change is determined by the persons' perception of the behavior as well as the way society views that same behavior. According to this theory, a person receiving SBS education would most likely view SBS as having only negative consequences. Therefore, they most likely would not shake a baby.

Prochaska and Velicer (1997) developed the Transtheoretical Model, which is also known as the Stages of Change Model where behavior change occurs within five stages. Individuals may move back and forth between pre-contemplation, contemplation, preparation, action, and maintenance (Prochaska & Velicer, 1997). The pre-contemplation stage is where an individual has no intent of behavior change and may or may not even be aware of the problem (Prochaska & Velicer, 1997). The individual then develops a desire to change a behavior in the contemplation stage (Prochaska & Velicer, 1997). During the preparation stage, there is intent to change the behavior within the next month, and during the action stage the new behavior is consistently exhibited (Prochaska & Velicer, 1997). An individual enters the maintenance stage once the new behavior is consistently portrayed for over six months (Prochaska & Velicer, 1997). According to this theory, adolescents in this research would be in the pre-contemplation stage where they have no intent to change their behavior regarding SBS because they are not yet aware of the problem. However, after receiving the information they would have the necessary information to enter the next stage and perhaps adopt an action plan not to shake a baby.

## **Behavior Change Studies in Adolescents**

Six studies were identified related to behavior change; knowledge change was an antecedent in all of them (Breunlin, Cimmarusti, Hetherington & Kinsman, 2006; Daly, Ziegler & Goldstein, 2004; Fisher, Fisher, Bryan & Misovich, 2002; Fritz, 2003; Hamilton, Cross, Resnicow & Hall, 2005; Stewart, Carter, Drinkwater, Hainsworth & Fairburn, 2001). Stewart et al., (2001) evaluated the effectiveness of a school-based eating disorder prevention program. The intervention did show knowledge and behavior change, however, the behavior change was modest in size and not sustained over time (Stewart et al., 2001).

Fisher et al., (2002) assessed the effects of three school-based HIV prevention interventions. The classroom-based intervention, after 12 months, resulted in sustained behavioral changes in HIV prevention (Fisher et al., 2002). However, the interventions involving peers were less effective than the classroom-based intervention at the 12-month follow-up. This is one of the few studies that had sustained behavior changes greater than three months.

Fritz (2003) evaluated a Computerized Adolescent Smoking Cessation Program to assess knowledge about smoking, initiate and sustain smoking cessation and to determine if the participant would move toward the action stage of the Transtheoretical Model. The results showed an increased number of quit attempts within the intervention group but no change in the duration of the attempt for the intervention or control subjects (Fritz, 2003). Nicotine dependence and the number of cigarettes smoked daily were significantly decreased for the intervention vs. the control subjects (Fritz, 2003). These results indicate that knowledge did change and the beginning of behavior change.

Daly et al., (2004) developed a short-term post-abortion group for adolescents, to offer them an opportunity to incorporate the experience of pregnancy and the abortion decision into their lives. Three months later the adolescents who participated indicated that they chose and used a consistent method of birth control and all participants remained in school and had no unplanned pregnancy (Daly et al., 2004). This study suggests that knowledge change did change behavior.

Hamilton et al., (2005) compared the impact of a school-based harm minimization smoking intervention to an abstinence-based program with over 4,000 students from 1999 to 2000 in Western Australia. At 20 months post-baseline the intervention group was less likely to smoke regularly (Hamilton et al., 2005). The authors concluded that the intervention appears to have been more effective than an abstinence-based program (Hamilton et al., 2005). The authors suggested that the change in behavior was due to knowledge and not just social influences.

Breunlin et al., (2006) reported on a high school-based intervention to reduce school-based violence. There was a positive result not only in knowledge but behavior as well. Over a four year period of time, suspensions for violence was cut in half compared to the prior four years (Breunlin et al., 2006). The authors suggest that knowledge change may need to occur before behavior change.

In conclusion, knowledge as a basis for behavior change appears to be supported in the literature. All of the behavior studies had knowledge change. Therefore, knowledge change appears to need to occur prior to the intended behavior. Otherwise that behavior may not occur at all. See Appendix E for these specific behavior change studies.

### **Conceptual Basis of Knowledge Needed to Prevent Shaken Baby Syndrome**

As earlier stated, habits developed in childhood and adolescence are more likely to persist as an integral part of one's lifestyle than changes made in adulthood (Pender et al., 2002). Given that adolescents are in the formal operational stage and are intellectually ready to learn (Piaget, 1967), this readiness may be the most appropriate time to gain knowledge regarding SBS prevention; assisting the adolescent to regulate their own behavior and assess their own competencies (Pender et al., 2002).

Dias et al., (2005) stated that the time of a child's birth may not be the best time to educate people about SBS as it is also a time of increased parental stress and the information given might not be recalled months later during a period of frustration (Dias et al., 2005). However, the Dias et al., (2005) study also indicated that a program administered at the appropriate moment has the greatest chance of success. The appropriate moment may be during adolescence when a person is ready to learn.

### **Shaken Baby Syndrome Prevention Studies**

After a comprehensive computer aided literature search two hospital based prevention related studies (Barr, et al., 2009; Dias et al., 2005) were identified out of 220 SBS articles. However, of those, 34 recommended prevention programs (Altimier, 2008; Barlow & Minns, 2000; Barr, 2007; Blake & Michael, 2006; Cargaugh, 2004; Castiglia, 2001; Chung, 1994; Cole, 2005; Coles & Collins, 2007; Coles & Kemp, 2003; Coody, Brown, Montgomery, Flynn & Yetman, 1994; Crozier & Barth, 2005; Davies & Garwood, 2001; Dias et al., 2005; Gilkerson, Gray & Mork, 2005; Gutierrez, Clements & Averill, 2004; Harmel, 2001; Hoffman, 2005; Lewin, 2008; Lowenstein, 2004; Miehl, 2005; Mungan, 2007; Nakagawa & Conway, 2004; O'Brine, 2005; Pantrini, 2002; Purdy,

2000; Reid & Coyle, 2003; Sales-Allison, 2006; Scowen, 2004; Showers, 2001; Smith, 2005; Thomson & Primiani, 2006; Wallis & Goodman, 2000; Wyszynski, 1999). Yet, there no studies were identified concerning a school-based adolescent prevention program.

As mentioned in Chapter One, Dias et al., (2005) examined a hospital-based, parent education program and its impact on the incidence of abusive head injuries among infants less than 36 months of age. All hospitals in an eight-county region of Western New York State participated beginning in December 1998 (Dias et al., 2005). The program was administered to parents of all newborn infants before the infant's discharge (Dias et al., 2005). The hospitals provided both parents, mothers and whenever possible, fathers or father figures, with SBS information and alternative responses to a crying infant (Dias et al., 2005).

Those that participated voluntarily signed a commitment statement acknowledging receipt and understanding of the information. Telephone interviews were conducted seven months later to assess recall (Dias et al., 2005). The follow-up telephone surveys suggested that greater than 95% of parents remembered having received the information (Dias et al., 2005).

During the first 5 ½ years of Dias et al., (2005) study, 65,205 commitment statements were documented, representing 69% of the 94,409 live births in the region during that time. Ninety six percent of commitment statements were signed by mothers and 76% by fathers or father figures. The results showed a decrease in the incidence of abusive head injuries by 47%, from 41.5 children per 100,000 live births to 22.2 children per 100,000 live births (Dias et al., 2005). No comparable decrease was seen in the

historical control group, the Commonwealth of Pennsylvania, during the years 1996-2002 (Dias et al., 2005). Dias et al., (2005) concluded that a hospital-based, parent education program can significantly reduce the incidence of abusive head injuries among infants and children less than 36 months of age.

It is noted that in the Dias et al., (2005) study the majority of people who received the information were females. Given that our family dynamics have changed over the last few decades, where fathers are as involved with raising children as much as mothers (Yeung, Sandberg, Davis-Kean & Hofferth, 2001) and that the majority of SBS perpetrators are male (Lazoritz et al., 1997), a school-based program would be able to provide this information to males as well as females. In addition, given that adolescence lends a time in which children are able to operationally learn (Piaget, 1967), a school-based educational program regarding SBS is likely to change knowledge with the ultimate hope that knowledge will give way to behavior change in the future.

### **Conclusions Drawn from the Literature**

1. Adolescence is a time when new health behaviors are laid down and behaviors that reach into adulthood will influence health and morbidity throughout life (Viner & Mcfarlane, 2005).
2. Habits developed in childhood and adolescence are more likely to persist as an integral part of lifestyle than changes made in health behaviors later in the adult years (Pender et al., 2002).
3. Adolescents are in the formal operational stage and are intellectually ready to learn (Piaget, 1967).

4. A SBS prevention intervention could be effective in changing knowledge and ultimately behavior (Dias et al., 2005).
5. An educational program administered at the appropriate time moment has the greatest chance of success, yet at the time of the child's birth may be too stressful for caregivers (Dias et al., 2005). Therefore a school-based program may provide the knowledge foundation for SBS prevention and possibly change future behavior.

### **Limitations in the Literature**

Studies related to behavior change are prevalent but few related to adolescents and even fewer actually examined knowledge change. No studies were found related to a school-based SBS educational program and its effectiveness. The Dias et al., (2005) study is the only published study that has assessed the impact of any of these programs on the incidence of SBS and the Barr et al., (2009) study was the only one that examined knowledge change and its impact on behavioral change.

### **Summary**

The ultimate primary prevention goal related to SBS education is to reduce its incidence. Despite the severity of the injuries and enormous societal costs, studies suggest that 25 to 50% of people have not received information about SBS (AAP, 2001). In some cases where perpetrators admitted to shaking an infant, they reported they were unaware of SBS and its outcomes (Dias et al., 2005).

A school-based program offers a promising setting for improving health behaviors and long-term outcomes based upon the Dias et al., (2005) and Barr et al., (2009) studies as well as the reported knowledge and behavior change studies. The availability of

empirically researched programs regarding SBS in schools may play a significant role in its prevention while saving health care dollars.

Dias et al., (2005) indicated that the temporal proximity to the child's birth, the relatively short period during which children are at risk, and the prevalence of parent perpetrators afford unique opportunities to intervene through a hospital-based parent education program. However, attendance at such health education programs by men is low (Lazoritz et al., 1997). Given that the majority of perpetrators are male (Lazoritz et al., 1997) schools may be the only place to reach them, as well as non-parental caregivers, who would not be participating in hospital based programs. In summary, knowledge received during the formative adolescent years may provide a solid foundation for the retrieval of this critical information when it is needed in the future.



## **Chapter 3: Research Design and Methods**

### **Overview**

The design for the two instrument development research studies will be detailed as well as the setting and sample, intervention, data collection techniques, and data analysis. After a thorough literature search no published instruments were found designed to measure knowledge change in the prevention of SBS or for a school-based program. However, an already developed un-published, un-tested educational program and qualitative measure created by Realityworks® (2009) was found and subsequently used as a template to develop such an instrument. See Appendix F for author permission letter from Realityworks® to use and reproduce their materials.

Instrument development began with two qualitative steps. First, a review of the published literature guided the initial instrument construction and second, the Realityworks® (2009) qualitative instrument was re-tooled into a 12-item quantitative one titled Understanding Shaken Baby Syndrome-12 (USBS-12). Please see Appendix G for a copy of the qualitative tool developed by Realityworks® (2009).

### **Initial Instrument Development Study**

#### **Setting and sample.**

A Midwest rural public high school was the setting for the initial instrument development study. Following Marquette University Institutional Review Board approval, the Principal and subsequently the Family and Consumer Education teacher, in whose classes this research would take place, were contacted.

One hundred and sixty five tenth graders were invited to participate. Two weeks prior to the intervention, the consent was read to the students by the researcher to assure

their understanding and sent home with a return date. Assent from the participant the day of the intervention was obtained after consent was verified. Whether or not consent was given, those returning the form had their name placed in a drawing for the \$25.00 Marcus Theatres, Pizza Hut and Itunes gift certificates. See Appendix H and I for the assent and consent respectively.

For this initial research study a minimum of 60 (five subjects per item) participants were needed to examine internal consistency according to Nunnally (1967). One experimental group (n=34) and one control group (n=28) were randomly assigned by classroom to receive the educational program. A table of random numbers was relied upon to accomplish this. The experimental group received a pre-test, the educational program and a post-test during one fifty-minute class period. The control group received the pre-test followed by the post-test two weeks later immediately followed by the educational intervention. This was done to assure that all participants received the intervention. Sample characteristics regarding age, gender, race and ethnicity were also collected. See Appendix J for the demographics form used during the initial and second instrument development studies as well as the research study.

### **Instrument.**

The 12 qualitative questions developed by Realityworks® (2009) were used to create 12 five option multiple choice questions for which one response was correct. A written multiple-choice test was chosen because this type of test is most cognitively objective and the most reliable (Waltz-Feher, Strickland & Lenz, 2005). In addition, according to Billings and Halstead (2005), an advantage of multiple choice items is that they are less influenced by guessing than scores on true-false tests. However, scores can

be affected by the students' reading ability and the instructor's writing style (Billings & Halstead, 2005).

The re-tooled quantitative instrument was then forwarded to a panel of five leading SBS researchers, who examined the items for face and content validity. Randell Alexander, MD, PhD, Robert Reece, MD, Brian Holmgren, JD, Alex Levin, MD, MHSC, FAAO, FRCSC, and Carole Jenny, MD, MBA, were chosen due to their vast expertise and published works concerning SBS. Please see Appendix K for their biographies. First, the panel reviewed each test item to ensure the items reflected a representative sample of the problems identified in relevant SBS literature. Second, they verified that the items included varying degrees of difficulty and appropriate wording.

Trochim (2001) describes that one of the major difficulties in writing good survey questions is getting the right words. He further states that even slight wording differences can confuse the respondent or lead to incorrect interpretations of the question (Trochim, 2001). Therefore, the experts' comments were carefully taken into account and only minor changes were made related to word choice.

The order of the 12 items was subsequently taken into consideration. Trochim (2001) indicates that the first few questions on an instrument establish the tone of the survey. Therefore, USBS-12 did not start with a sensitive or threatening question. See Appendix L for USBS-12.

### **Data analysis.**

Items with uniform correct responses or responses lacking in variability were excluded. Data analysis included descriptive statistics for the scale and individual items, Cronbach's alpha coefficient to examine internal consistency, and test-retest (two week)

to assess stability of the instrument. Discrimination index for each item and sensitivity of each item concerning changes in knowledge about the prevention of SBS were also examined.

“Descriptive statistics are used to describe and synthesize data” (Polit, Beck & Hungler, 2001, p. 451). Frequency and percentage distributions, means, and standard deviations were examined. In all statistical tests, a .05 level of significance was used. See Table 3.1 for a demographics summary related to the initial instrument development study.

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**Table 3.1 Sample Demographics for Initial Instrument Development Study**


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	<b>Control Group n=28</b>	<b>Intervention Group n=34</b>
<b>Ethnicity</b>		
Hispanic	0	4
Non-Hispanic	24	30
Missing Data	4	0
<b>Race</b>		
White	27	31
Black or African American	0	2
Asian	1	0
American Indian or Alaska Native	0	1
Missing Data	0	0
<b>Gender</b>		
Males	18	20
Females	9	14
Missing Data	1	0
<b>Age</b>		
14	12	18
15	14	16
16	0	0
17	1	0
18	0	0
Missing Data	0	0

---

The reliability of a quantitative instrument is a major criterion for assessing its quality and refers to the consistency with which an instrument measures an attribute; in this case it is knowledge change (Polit et al., 2001). Two aspects of reliability of interest in this research were stability and internal consistency.

Stability of this instrument was derived through test re-test reliability procedures (Polit et al., 2001). The “stability of an instrument is the extent to which the same scores are obtained when the instrument is used with the same people on separate occasions” (Polit et al., 2001, p. 453). Reliability coefficients, designated as  $r$ , range from 0 to 1.00; the higher the value, the more reliable or stable the instrument is (Polit et al., 2001).

Internal consistency was estimated using Cronbach’s alpha coefficient. “A reliability coefficient in the range of .70 to .80 is acceptable for classroom tests” (Billings & Halstead, 2005, p. 510). “The higher the reliability coefficient, the more accurate or internally consistent the instrument is” (Polit et al., 2001, p. 326).

“Item Discrimination was measured as a point biserial correlation which compared each student’s item performance with each student’s overall test performance” (Billings & Halstead, 2005, p. 514). If a question discriminates well, the point biserial correlation will be highly positive for the correct answer and negative for the distracters (Billings & Halstead, 2005). For purposes of this research Hopkins’ (1998, p. 260) index of discrimination guidelines was used. See Table 3.2 for indices and Table 3.3 for point bi-serial correlations for USBS-12.

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**Table 3.2 Guidelines for Interpreting Discrimination Indices**

.400 and up Excellent Discrimination

.300 to .390 Good Discrimination

.100 to .290 Fair Discrimination

.010 to .100 Poor Discrimination

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The sensitivity of an instrument refers to the ability to determine those individuals with a given trait (Polit & Beck, 2004). In this research sensitivity was examined based on what percentage of the intervention group got the question correct vs. the control group on post-test. The sensitivity for USBS-12 is also shown in Table 3.3.

As a result of the above data analysis process, four items were initially removed, numbers 6, 8, 9 and 11, to increase internal consistency. Without the removal of these four items, Cronbach's alpha was .20; with the exclusion of them, it increased to .65. Further removal of items would have eliminated essential content.

The low alpha coefficient may have been due to the small sample size ( $n=62$ ). Therefore, to develop the instrument further, the original 12 items were kept without change and the items that contributed to a low alpha (2, 6, 7, 9, and 12) were re-worded, since the original questions appeared to be somewhat long and may have been confusing per the expert panel. Those re-worded questions were then added to USBS-12. In addition, after further review of the relationship between the curriculum and its content, 10 new content items were developed by the researcher and once again given to the above named experts for face and content validity. Slight word modifications were made

based upon the expert panel review. No content recommendations were made. The result of this process was a new 27-item instrument, re-named Understanding Shaken Baby Syndrome-27 (USBS-27). See Appendix M for USBS-27.

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**Table 3.3 Point Biserial Correlations and Sensitivity for USBS-12**

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<b>Item</b>	<b><i>r</i> =</b>	<b>Sensitivity Intervention Group (%)</b>	<b>Sensitivity Control Group (%)</b>
1	.375	97.1	100.0
2	.536	100.0	85.7
3	.571	94.1	82.1
4	.562	97.1	82.1
5	.394	88.2	75.0
6	.204	47.1	42.9
7	.452	85.3	46.4
8	.457	85.3	42.9
9	.100	79.4	39.3
10	.500	100.0	92.9
11	.390	88.2	50.0
12	.487	88.2	75.0

---



## **Second Instrument Development Study**

### **Setting and sample.**

A Midwest urban public high school was the setting for the second instrument development study. Five hundred and fourteen tenth graders, ages 13-18, were recruited and invited to participate to gain a minimum of 135 participants to examine internal consistency (5 participants times 27 items = 135 participants) (Nunnally, 1967). Consent was received prior to assent from each participant and 206 consents were received. One intervention group (n=105) and one control group (n=101) were then randomly assigned by classroom to receive the educational program. A table of random numbers was again relied upon to accomplish this. The identical research design used in the initial instrument development research study was used in this second study as well. Sample characteristics regarding age, gender, race and ethnicity were also collected. See Table 3.4 for sample demographics for second instrument development study.

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**Table 3.4 Sample Demographics for Second Instrument Development Study**


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	Control Group n=101	Intervention Group n=105
<b>Ethnicity</b>		
Hispanic	18	11
Non-Hispanic	79	89
Missing Data	4	5
<b>Race</b>		
White	10	11
Black or African American	57	69
Asian	13	4
American Indian or Alaska Native	8	7
Missing Data	13	14
<b>Gender</b>		
Males	68	69
Females	30	32
Missing Data	3	4
<b>Age</b>		
14	3	13
15	19	42
16	51	23
17	23	8
18	2	7
Missing Data	3	12

---

**Instrument.**

USBS-27 was subsequently re-tested for further instrument development to achieve a Cronbach's alpha coefficient of .70 or better before completing the dissertation research. As in the initial instrument development study, items with uniform correct responses or responses lacking in variability were excluded. Data analysis included descriptive statistics for the scale and individual items, Cronbach's alpha coefficient to examine internal consistency, test-retest (two week) to assess stability of the instrument, discrimination index for each item, and sensitivity of each item to changes in knowledge.

As a result of this process numbers 2, 3, 5, 9, 10, 11, 16, 17, 18, 19, 20, 21, 22, 23, 24 and 25 were kept without changes due to good item discrimination. Numbers 4, 8, 12 and 15 were re-worded and numbers 1, 6, 7, 13, 14, 26 and 27 were removed. Without the removal of these seven items, Cronbach's alpha was .65. With the exclusion of those seven items, Cronbach's alpha coefficient increased to .73. Even though a Cronbach's alpha of .75 could have been achieved by deleting three additional items, important content necessary to sample the domain for knowledge change and SBS prevention would have been lost. Consequently, a new 20-item instrument was generated and re-distributed to the named SBS experts. No modifications were made based upon the information gathered. The result of this process was a 20-item instrument re-named Understanding Shaken Baby Syndrome-20 (USBS-20). The two week test re-test was  $r=.668$ . See Appendix N for USBS-20 and Table 3.5 for point biserial correlations and sensitivity for USBS-27.

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**Table 3.5 Point Biserial Correlations and Sensitivity for the USBS-27**


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<b>Item</b>	<b><i>r</i> =</b>	<b>Sensitivity Intervention Group (%)</b>	<b>Sensitivity Control Group (%)</b>
1	.208	97.1	70.2
2	.518	83.8	70.3
3	.532	70.5	70.3
4	.353	89.5	72.3
5	.603	66.7	50.5
6	.189	32.4	41.6
7	.248	61.0	51.5
8	.318	73.3	52.5
9	.158	57.1	40.6
10	.592	88.6	76.2
11	.441	70.5	39.6
12	.530	76.2	53.5
13	.617	64.8	60.4
14	.454	34.3	38.6
15	.348	41.9	43.6
16	.319	48.6	27.7
17	.587	78.1	64.4
18	.497	78.1	56.4

19	.284	94.3	73.3
20	.486	81.9	65.3
21	.445	74.3	58.4
22	.386	79.0	52.5
23	.459	74.3	62.4
24	.686	79.0	70.3
25	.382	68.6	33.7
26	.300	40.0	33.7
27	.645	59.0	36.6

---

## **Research Methods**

### **Design.**

The dissertation research was then conducted using the USBS-20 to determine if education is effective in changing knowledge regarding SBS prevention. The dependent variable was knowledge change resulting from participation in the SBS educational program and the independent variable was the intervention.

The pre-test post-test or before-after control group design for this research was selected based upon the research question to empirically investigate knowledge change and to determine if there is a difference between an intervention and no intervention. It was also chosen because it is most effective in examining the cause-effect relationship (Polit, Beck & Hungler, 2001).

**Sample and setting.**

In conducting and evaluating quantitative research, the number of subjects in a sample is a key issue (Polit & Beck, 2004). According to Polit and Beck (2004) the larger the sample, the more representative it is likely to be and the smaller the sampling error. However, the researcher must estimate how large the group difference will be through a power analysis (Polit & Beck, 2004).

Given there were no prior studies that estimated effect size, USBS-20 was based upon earlier versions of the instrument where it was determined that an effect size of .40 could be expected. According to Polit and Beck (2008, p. 604), effect size in a two-group test of mean differences for most nursing studies ranged between .20 and .40. When a power analysis is performed, the minimum power that is generally considered acceptable is .80 (Polit & Beck, 2008). The sample size needed for this to be achieved using Polit and Beck (2008) was 98 subjects in each group with a medium effect of .40 and a power of .80.

A Wisconsin urban public high school was the setting for this convenience sample. All tenth graders were invited to participate because according to Prevent Violence Against Children Act, 2005 Wisconsin Act 165, the public school system is mandated to provide SBS education between the 5<sup>th</sup> and 8<sup>th</sup> grade levels as well as between the 10<sup>th</sup> through 12<sup>th</sup> grade levels. There was one experimental group and one control group that were randomly assigned by classroom to receive the educational program. A table of random numbers was relied upon to accomplish this.

The experimental group received the pre-test, educational program and post-test during the same class period. The control group received the pre-test and 2 weeks later

the post-test immediately followed by the educational program. This was done to assure that all participants received the intervention. Polit et al., (2001) indicate that randomly assigned groups are expected to be comparable, on average, with respect to an infinite number of biologic, psychological, and social traits at the outset of the study and that any group differences that emerge after random assignment can therefore be attributed to the treatment. See Appendix O for the research design model.

Inclusion criteria for this research were all tenth grade students ages 13 to 18. There were no exclusion criteria. Three hundred and twenty four students were recruited with the intent to gain a minimum of 200 participants. After consent and assent were obtained, 134 were included in the intervention group and 126 were in the control group. The sample size was deemed adequate to achieve significance based upon the above stated effect size. See Appendix P and Q respectively for copies of the consent and assent used in this research. Please note this consent and assent were also used for the second instrument development research study.

### **Instrument.**

USBS-20 was the instrument used in this research developed by the researcher from the two previously described instrument development research studies. Please see sections 3.2 and 3.3 for details on how this instrument was developed.

### **Intervention.**

The curriculum developed by Realityworks® (2009) called “Understanding Shaken Baby Syndrome” was selected because it is not simply a didactic method of education. Rather it utilizes an infant SBS Simulator™ and multiple types of media.

***Realityworks® shaken baby syndrome simulator™.***

The Realityworks® (2009) SBS Simulator™ is designed to demonstrate the result of violently shaking a baby or young child. It demonstrates the amount of force needed to permanently disable and or cause the death of a baby. Motion sensors in the simulator's head, called accelerometers, measure the degree of acceleration. The simulator's head is labeled with symbols that represent the functions lost when those areas of the brain are injured. The simulator's head and face are clear so that the lighted LED's are visible. When brain movement from shaking reaches levels that cause injury, those affected areas light up. See Appendix R for the specific operations of the SBS Simulator™.

***Realityworks® curriculum.***

This curriculum uses the SBS Simulator™ and additional teaching aids to educate students about the physical injuries caused by shaking a baby. The curriculum presents the clinical symptoms of a severe shaking, the situations that can lead to a caregiver's loss of control, and ways to anticipate and ease the frustration, anger, and stress that can occur when caring for a baby or young child (Realityworks®, 2009). This curriculum was designed to be used with public and private schools, middle and high school classes as well as other community and clinical education classes (Realityworks®, 2009).

The activities described require between 40 and 60 minutes of presentation time. The available class time in this research was 50 minutes long. With supplemental materials, this lesson can be adapted to a larger block of time (e.g., 80 to 90 minutes). However, for purposes of this research, the additional materials were not used due to the



time constraints. The following instructional materials were used from the Realityworks® (2009) curriculum:

- ‘What Happens During a Shaking?’ Demonstration Overhead
- Overhead Slides Set
- ‘My Plan to Manage Frustration’ Form (See Appendix S)
- Pledge Not to Shake

The specific procedures and related materials can be found in Appendix T.

### **Procedures.**

The recruitment process initially included contacting and gaining permission from the Curriculum Specialist. The Research Specialist through the schools Division of Research and Assessment was then contacted and a research request per their protocol was submitted and subsequently approved. Direct contact with the family and consumer education teacher was subsequently made to gain permission to include their classes.

The students were read the consent to assure their understanding and sent home with a return date. Once consent was obtained and verified assent from the child was then requested. Whether or not consent was received, those returning the form had their name placed in a drawing for the \$25.00 Marcus Theatres, Pizza Hut and Itunes gift certificates.

### **Step-by-step data collection.**

Control Group Procedures:

- Completed USBS-20 pre-test
- Two weeks later, completed USBS-20 post-test
- Received Realityworks® (2009) education intervention

#### Intervention Group Procedures:

- Completed USBS-20 pre-test
- Received Reality Works® education intervention
- Completed USBS-20 post-test
- All three steps were completed in one 50 minute class period

#### **Data analysis.**

Testing of two samples provided quantitative data to further inform item development. Items with uniform correct responses or responses lacking in variability were excluded. Data analysis included descriptive statistics for the sample and scale, Cronbach's alpha coefficient to examine internal consistency, discrimination index for each item and difficulty of each item. T-tests were used to examine mean differences between intervention and control groups on pre-test and post-test as well as difference scores. Given previously reported increased prevalence of male SBS perpetrators (Lazoritz et al., 1997) a secondary general linear model analysis of gender by group differences with age as a covariate was performed. T-tests to examine gender differences in scores on pre-test, post-test and in mean difference scores were also performed.

#### **Protection of human subjects.**

Consents and assents for the instrument development studies and this research will be saved for seven years. All information will be stored in a locked file cabinet in a locked attic. The researcher is the only one that has access to this room and cabinet. While the data was collected and analyzed the identifying information and the code number were also kept separate and locked. Additionally, after the data was collected and analyzed the identifying information that linked the students' information to the code

number was destroyed via shredding. As a result, there is no link between the collected data and research subjects.

The benefits related to participation in this research were discussed with the participants. They included receiving appropriate and correct information regarding SBS in a setting where they could ask questions. Participants were also informed there was no direct benefit for being in this research. However, they may gain a better understanding of SBS, how it can be prevented and ways to handle a crying baby. The risks related to being in this research were also discussed which included no more than any other child would come across in everyday life.

The instrument was not likely to be upsetting, but may be sensitive as the majority of children who are shaken are left with permanent injury or die. All participants were informed to contact the researcher directly if they had any questions, or discuss it with their teacher. No verbal or written communication has been received from either a participant or teacher.

Education about SBS was provided regardless of student research participation due to an educational requirement from the Wisconsin Department of Public Instruction and was the request of the school's Curriculum Specialist. See Appendix U and V for approval letters for the initial and second instrument development studies and the dissertation research from the Office of Research Compliance at Marquette University.

### **Limitations.**

Randomization was not completed per participant but rather per class to eliminate dismantling the class and reduce disruption. There was some difficulty in obtaining

parental consent, thereby yielding a smaller sample than intended in the first and second instrument development studies.

During the second instrument development study random error occurred when a fire alarm went off. A bomb threat was also received at the school creating another random error. These happened on different days and in different classes. The classes resumed, however, the interruption still occurred. Additionally during the second instrument development study, one participant had an SBS death in her immediate family. The class was aware prior to the research and this participant opted not to participate and was excused from the class per her request.

In addition, during the second instrument development study the 50 minute class time was not enough time for the participants in the intervention group to complete the post-test and receive the intervention. This was due to the length of USBS-27. Permission was granted by the teacher prior to the class for them to complete the post-test, which took approximately 4 additional minutes after the class ended.

Random errors come from uncontrolled events and are not reproducible (Trochim, 2001). They usually result in an inability to take the same measurement the same way each time (Trochim, 2001). By contrast, systematic errors are reproducible and are often due to something that continues throughout the entire experiment (Trochim, 2001). To the knowledge of this author no systematic errors occurred.

### **Strengths.**

The strength of this research is the design. It is the most rigorous of all research designs and has the strongest internal validity. Random assignment by classroom allowed the same intervention to be given to the whole class and also prevented diffusion

of the intervention to the control group. The sample and setting represent a group in which SBS prevention is required by law. In addition, the instrument was developed through two studies with attention to face and content validity, internal consistency, stability, and sensitivity to prevention education. Results of the dissertation research examining the research question can be found in Chapter 4.

## **Chapter 4: Results**

### **Introduction**

In this chapter, descriptive statistics for the sample, estimates of reliability, validity and findings for USBS-20 will be described. It is divided into several sections: description of sample and setting, findings, instrument and summary.

### **Description of Sample and Setting**

The sample for this study was comprised of 260 participants: 134 participants in the intervention group and 126 participants in the control group. They were randomly assigned by classroom. See Table 4.1 for sample demographics.

### **Findings**

In this section internal consistency, reliability, sensitivity, item difficulty and item discrimination analyses for USBS-20 will be described. Using the sample of 260 participants the Statistical Program for the Social Sciences (SPSS) and EXCEL were used to perform data analysis. The total scale mean score of the USBS-20 was 3.76 with a standard deviation of .93. The item means ranged in value from 1.63 to 4.89. The average inter-item correlation ranged from .22 to .60. Table 4.2 presents the item mean scores on the 260 exams.

---

**Table 4.1 Sample Demographics**


---

	<b>Control Group n=126</b>	<b>Intervention Group n=134</b>
<b>Ethnicity</b>		
Hispanic	23	27
Non-Hispanic	65	97
Missing Data	38	10
<b>Race</b>		
White	12	9
Black or African American	86	78
Asian	7	13
American Indian or Alaska Native	2	2
Missing Data	19	35
<b>Gender</b>		
Males	44	74
Females	82	59
Missing Data	0	1
<b>Age</b>		
15	31	31
16	87	92
17	7	7
18	0	1
Missing Data	1	3

---

---

**Table 4.2 Item Means and Standard Deviations for USBS-20**

---

<b>Test Item</b>	<b>Mean</b>	<b>Standard Deviation</b>
1	4.84	.70
2	4.76	.76
3	2.05	.45
4	4.64	.90
5	1.67	1.27
6	3.97	1.45
7	4.89	.58
8	4.32	1.30
9	1.63	1.29
10	4.76	.75
11	3.99	1.39
12	3.79	.78
13	4.32	1.28
14	2.06	.52
15	2.00	.59
16	4.75	.93
17	4.03	.75
18	4.36	1.36
19	4.89	.51
20	3.42	1.04

---



To determine the reliability of the USBS-20 coefficient alpha was calculated and found to be .49. Numbers 3, 5, 9, 13, 14, 15 and 20 were removed to increase alpha to .71. These seven items were either mastery items or the content was duplicated in other items. USBS-20 was subsequently re-named USBS-13.

Furthermore, item discrimination for USBS-13 was measured as a point biserial correlation which compares each student's item performance with each student's overall test performance (Billings & Halstead, 2005). Hopkins' (1998, p. 260) index of discrimination guidelines are stated below in Table 4.3 and were used in reference to findings in this research. See Table 4.4 for point biserial correlations for USBS-13.

---

**Table 4.3 Index of Item Discrimination Guidelines**

---

.400 and up Excellent Discrimination

.300 to .390 Good Discrimination

.100 to .290 Fair Discrimination

.010 to .100 Poor Discrimination

---

---

**Table 4.4 Point Biserial Correlations for USBS-13**

---

<b>Item</b>	<b><i>r</i> =</b>
1	.517
2	.603
3	.487
4	.419
5	.413
6	.513
7	.545
8	.330
9	.322
10	.322
11	.320
12	.471
13	.501

---

An analysis of item difficulty using all available data was then performed on USBS-13. The purpose of conducting an analysis of the items is to statistically determine just how easy or just how hard the test truly is, how well the items are separating the high scorers from the lower scorers and how well the items are able to reproduce scores. The item difficulty index (*p* value) is simply the percentage correct for the group answering the item (Billings & Halstead, 2009). The upper limit of item difficulty is 1.0, meaning

that 100% of students answered the question correctly. The lower limit of item difficulty depends on the number of possible responses and is the probability of guessing the correct answer (Billings & Halstead, 2009). McDonald (2007) recommends keeping the  $p$  values of the items in the range of 0.70 and 0.80 to help ensure that questions separate learners from non-learners. Item difficulty for USBS-20 and USBS-13 is shown in Table 4.5. See Appendix W for USBS-13.

---

**Table 4.5 Item difficulty for USBS-20 and USBS-13**

---

<b>Test Item</b>	<b>New Test Item Number</b>	<b><math>p</math></b>
1	1	.94
2	2	.88
3	deleted	.95
4	3	.84
5	deleted	.60
6	4	.60
7	5	.96
8	6	.76
9	deleted	.83
10	7	.87
11	8	.56
12	9	.81
13	deleted	.77
14	deleted	.91

15	deleted	.83
16	10	.82
17	11	.74
18	12	.76
19	13	.77
20	deleted	.60

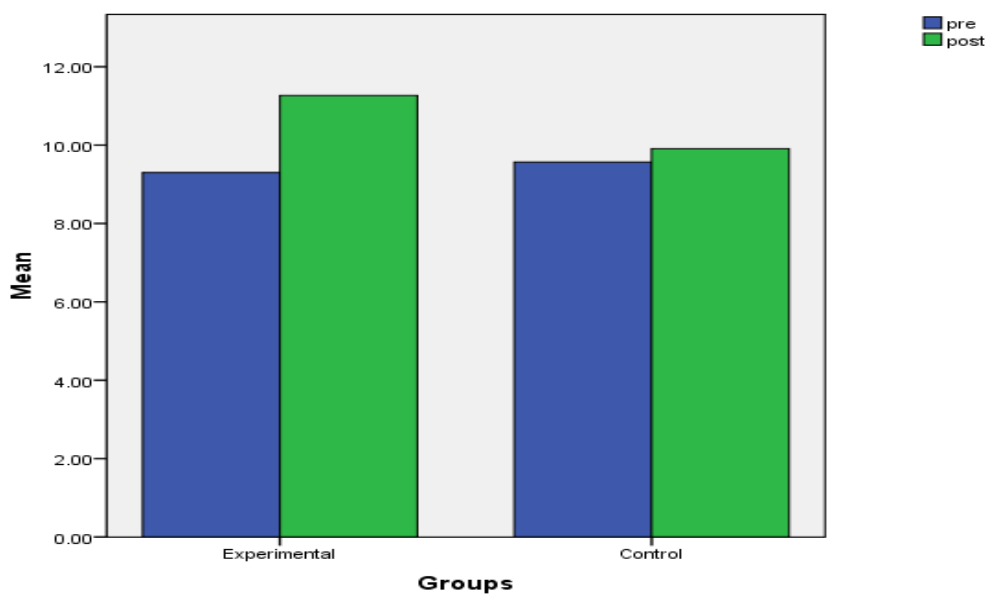
---

### **Instrument**

The thirteen-item multiple choice instrument named USBS-13 was ultimately developed through the above described process. The average difficulty for USBS-13 was .79 with a range from .56 - .96 suggesting the overall test is moderately difficult and the questions do separate the learners from the non-learners (McDonald, 2007). Two-tailed t-tests were also completed to determine if the intervention group was different on the pre-test and then on the post-test compared to the control group. A change score was also computed (post-test minus pre-test scores) as well as the two tailed t-test between groups. This is shown in Table 4.6. A higher change score indicates improved knowledge. Figure 4.1 represents the estimated marginal means of post-test compared to pre-test scores.

**Table 4.6 Two Tailed t-tests Results**

	Test	N	Mean	Std. Deviation	t	p=
Pre-test	Experimental	124	9.28	2.53	-.69	.49
	Control	113	9.50	2.38		
Post-test	Experimental	124	11.23	2.15	4.66	.00
	Control	105	9.85	2.32		
Post minus pre-test	Experimental	116	4.48	5.97	5.40	.00
	Control	99	.44	4.99		

**Figure 4.1 Estimated Marginal Means of Post and Pre-test Scores**

Since this was initial research to determine if knowledge scores improved following a school based intervention and males have been the predominant perpetrators in SBS (Lazoritz et al., 1997, 2001; NCSBS, 2009) a secondary analysis was performed to examine whether there were differences in response to the intervention by gender.

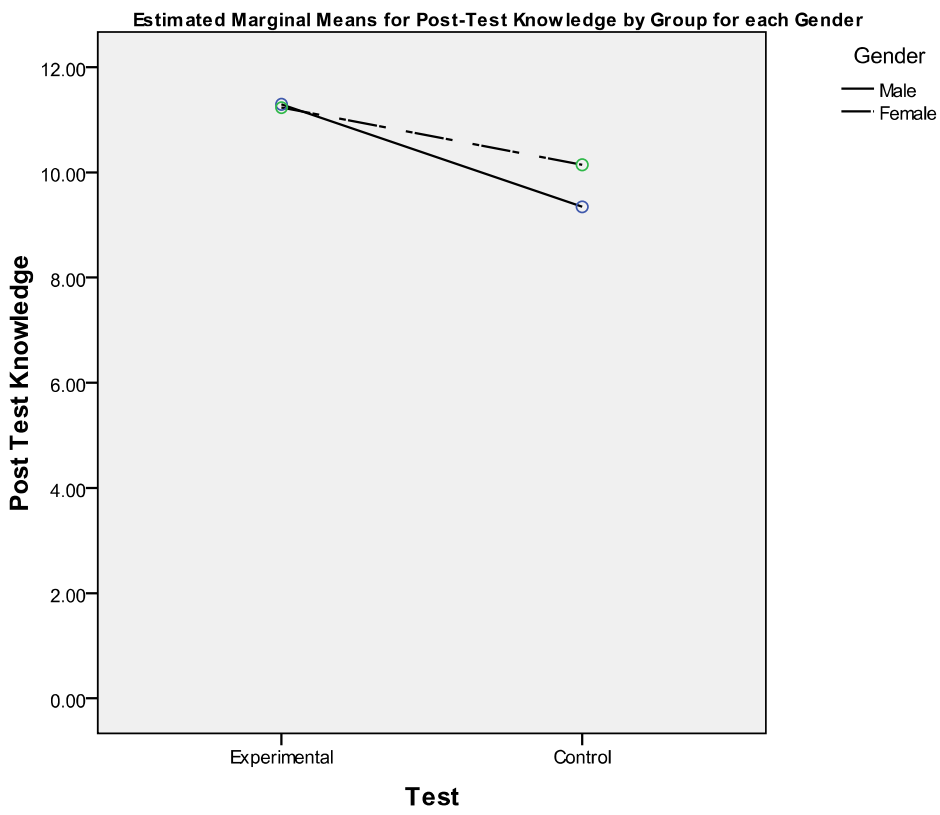
Analysis of Covariance (ANCOVA) was completed wherein gender and group interaction effects of the change score were examined with age as a covariate  $F(1,1) = 98.36, p < .058$ . The model assumptions of normality and homogeneity of variances were examined and no deviations were noted. The gender times group interaction was not significant  $p = .63$ . The observed power was .60, meaning there would be a 40% chance of making a Type II error (Polit & Beck, 2008).

Since gender differences have been reported in the literature (Lazoritz et al., 1997, 2001; NCSBS, 2009), the file was split and two tailed t-tests were run as shown in Table 4.7. Performing multiple t-tests can increase the chance of Type I error (Polit & Beck, 2008), so these results should be interpreted with caution. To graphically review the estimated marginal means for post-test knowledge by group for each gender see figure 4.2.

**Table 4.7 Group Differences for Each Gender**

Gender	Test	N	Mean	Std. Deviation	t value	p=	
Male	Pre-test	Experimental	68	9.05	2.80	.80	.42
		Control	35	8.60	2.64		
	Post-test	Experimental	68	11.19	2.22	3.79	.00
		Control	34	9.29	2.68		
	Post minus pre-test	Experimental	64	5.09	6.36	3.01	.00
		Control	29	.86	6.12		
Female	Pre-test	Experimental	56	9.55	2.15	-.95	.35
		Control	78	9.91	2.16		
	Post-test	Experimental	55	11.24	2.09	2.08	.00
		Control	71	10.11	2.10		
	Post minus pre-test	Experimental	52	3.73	5.42	3.86	.00
		Control	70	.27	4.48		

**Figure 4.2 Estimated Marginal Means for Post-test Knowledge by Group for each Gender**



Since previous studies have not reported significant differences by race or culture and the numbers of all but African Americans were small, t-test for independent samples test and group statistics were completed and are shown in Appendix X. The same pattern of an increased knowledge score, measured by USBS-13, for the intervention group compared to the control on post-test was consistently observed for each cultural (Hispanic/non-Hispanic) and racial group (American Indian/Alaska Native, Asian, African American, Caucasian).

## Summary

In this chapter, the results of the reliability, validity and item analyses were presented on USBS-20 and USBS-13. The coefficient alpha was .71, which is sufficient for a new instrument (Nunnally, 1967). Face and content validity was established by a panel of experts during development of the instrument and the average item difficulty was 0.79 and the average item discrimination was .44. These values indicate the test instrument was moderately difficult and had good discrimination.

The sample size was determined to answer the research question: Is a school-based program effective in increasing knowledge regarding the prevention of Shaken Baby Syndrome? Intervention and control groups randomly assigned by classroom were given the USBS-20 as a pre-test and post-test. See Appendix Y for Marquette University Institutional Review Board approval which included the development and use of USBS-13. The groups did not differ on pre-test, but the intervention group had significantly higher scores on post-test. Differences or interaction effects for race, culture, or age could not be examined in this study due to insufficient sample size limiting statistical power. However, it was still examined and the intervention group compared to the control on post-test consistently observed an increase knowledge change score for each cultural (Hispanic/non-Hispanic) and racial group (American Indian/Alaska Native, Asian, African American, and Caucasian).



## **Chapter 5: Discussion and Conclusions**

### **Overview**

The purpose of this chapter is to summarize and discuss the findings related to the research question “Is a school-based program effective in increasing knowledge regarding the prevention of Shaken Baby Syndrome?” It is divided into several sections beginning with the interpretation and statistical importance of the findings, their clinical and practical implications and previous research in support of knowledge change. The theoretical and conceptual framework utilized and the implications for nursing practice, education and research and those implications for vulnerable populations are also discussed. This is followed by the strengths and limitations of this research as well as future research suggestions.

### **Interpretations and Statistical Importance of the Findings**

Two studies were completed to develop the quantitative instrument, USBS-20, prior to the initiation of the intended research. The final dissertation research also included further examination of USBS-20 as well as answering the research question. The findings of this research support that a school-based program is effective in increasing knowledge regarding the prevention of SBS.

USBS-20 was administered in a pre-test post-test or a before and after, control group design. An expert panel found the USBS-20 to contain a representative sample of SBS content. The items were determined to be clear and were written at a variety of difficulty levels. The collection of pre-test data was conducted before the experiment.

An initial coefficient alpha of .49 was found with a sample size of 260 students. After careful review and consideration of content along with item discrimination, seven

items were removed to increase internal consistency to .71 which is considered sufficient for a new scale (Nunnally, 1967). The discrimination index was also used to measure how well each item was scored by those who did well on the test as a whole in comparison to those who did not. Item difficulty analysis was conducted; the scale included items that were moderately difficult as well as some mastery items. As a result of the analysis the altered instrument was consequently named USBS-13 after the seven items were removed to improve internal consistency and item difficulty.

There was a significant difference between the intervention and control groups on post-test ( $p=.00$ ) using a two-tailed t-test. Given there was no significant group difference on pre-test, this provides evidence that the intervention improved knowledge to prevent SBS. Though the research question implied a directional hypothesis and a one-tailed t-test, even the two-tailed t-test, a more conservative approach, was highly significant. An intent to treat analysis was used (Polit & Beck, 2008), such that all students present for the post-test were included, which again is the most conservative approach (Polit & Beck, 2008).

Data were also analyzed by computing a change (post minus pre) score for the USBS-13. The t-test was also significant ( $p=.00$ ). This approach has the advantage of individual student scores (post-test and pre-test) being compared by group, so change can be computed. There are difficulties in analyzing change scores, particularly if one group is lower on pre-test or if the variance between pre-test and post-test scores differs (Waltz-Feher et al., 2005). However, there was no significant difference between groups on pre-test using USBS-13, so the consideration of the highly significant difference scores

between groups provides further evidence that knowledge improved as a result of the intervention.

As found in the literature shaken baby abuse is not limited to any special group of people, however, males tend to predominate as perpetrators 65 to 90% of the time (Dias et al., 2005; Lazoritz et al., 1997; NCSBS, 2009). Though this research was underpowered to analyze group by gender interactions, separate two-tailed t-tests for gender demonstrated that the intervention improved knowledge for males as well as females ( $p=.000$  for post-test differences with no significant differences on pre-test). Although there are interpretation issues with change scores, the intervention group (males and females) improved significantly compared to the control when change scores were used ( $p=.003$ ).

Abusive or inflicted head trauma accounts for 95% of fatal or life-threatening injuries in children under the age of one (AAP, 2001; King et al., 2003). Since males have a higher risk of being the perpetrator (Lazoritz & Palusci, 2001) and have a tendency not to attend community based programs (Showers, 1994, 1997 & 2001) it is crucial that young men be reached prior to finishing high school and becoming fathers or caregivers. Though the study was underpowered to examine gender by group effects, and there is a risk of a Type I error when using a number of t-tests, findings from this study lend support that an educational program can improve knowledge for a group that is important to reach in preventing SBS.

### **Clinical and Practical Implications**

According to the American Academy of Pediatrics report on SBS (2001) head injuries are the leading cause of traumatic death and the leading cause of child abuse

fatalities. As early as 1984, Ludwig and Warman also found that homicide was the leading cause of injury-related deaths in infants younger than four years old. Given that all babies cry and crying is cited as the number one reason why perpetrators shake children, it is critical for all people to receive this information. Everyone has the capacity to shake a baby. No one is exempt as all people can get frustrated. At some point virtually everyone is in a situation where they are taking care of a child. It is therefore imperative for all people to be educated about SBS and its devastating and often permanent effects. Because high school is a time when all people can receive information to prevent SBS, it is important that the educational intervention has been determined to improve knowledge to prevent SBS.

Given that the sample was predominately African American, this study was underpowered to examine intervention effectiveness by race or culture. However, prior studies have indicated that race/cultural groups are essentially equal at risk for SBS (Barlow et al., 1998; Blumenthal, 2002; Lazoritz & Palusci, 2001), and data from this study demonstrate that each race/ethnicity group had improved knowledge after the intervention as compared to the control group.

### **Previous Research In Support of Knowledge Change**

Previous research related to adolescent knowledge change in interventional studies is limited, seventeen studies supported that knowledge can change in the adolescent (Barnet & Hurst, 2003; Breunlin et al., 2006; Daly et al., 2004; Fisher et al., 2002; Fowler, 1991; Fritz, 2003; Hamilton et al., 2005; Kristjansson et al., 2003; Ma et al., 2004; McBride & Farrington, 2000; McBride et al., 2000; Ostfeld et al., 2005; Portzky & van Heeringen, 2006; Robinson et al., 2003; Stewart et al., 2001; Sussman et

al., 2002; Wan & Bateman, 2007). Six of the 17 studies that supported knowledge change also supported behavior change (Breunlin et al., 2006; Daly et al., 2004; Fisher et al., 2002; Hamilton et al., 2005; McBride & Farrington, 2000; Stewart et al., 2001).

The knowledge change seen in this research is congruent with the studies that supported knowledge change. However, given that only six of the studies showed behavior change (Breunlin et al., 2006; Daly et al., 2004; Fisher et al., 2002; Hamilton et al., 2005; McBride & Farrington, 2000; Stewart et al., 2001) it cannot be assumed that knowledge change leads to behavior change. However, those studies that did not show behavior change also did not necessarily test for it, or the intended behavior change was in the future and not measured.

Previous research regarding the prevention of SBS is very limited in nature and non-existent regarding a school-based program. The most dramatic outcome regarding shaken baby syndrome prevention began only a decade ago in 1998 (Dias et al., 2005) and further studies are needed. However, this research has presented two major facts, that Realityworks® “Understanding Shaken Baby Syndrome” curriculum does change knowledge as measured by USBS-13 and that a school-based primary prevention program does provide knowledge that may serve as a foundation for retrieval of that information to prevent shaken baby syndrome in the future.

### **Theoretical and Conceptual Framework/Model**

Further research is necessary to examine the components of Pender’s HPM and other behavior change theories in SBS since this is the first study of its kind. Since self-efficacy and attitude change were found to predict behavior change (Callaghan, 2005, 2006; Dishman, Motl, Saunders, Felton, Ward, Dowda & Pate, 2004, 2005; Dunton,

Schneider & Cooper, 2007; Ebreo, Feist-Price, Siewe & Zimmerman, 2002; Fisher et al., 2002; Fowler, 1991, Frenn & Malin, 1998; Fritz, 2003, Jamner, Spruijt-Metz, Bassin & Cooper, 2004; Kristjánsson et al., 2003; McBride & Farrington, 2000; Morowatisharifabad & Shirazi, 2007), these constructs should be examined regarding their relationship to SBS prevention.

### **Implications for Nursing Practice, Education and Research**

SBS remains an extremely serious form of child abuse with high morbidity and mortality rates. In the past two decades news coverage of individual cases and public awareness campaigns may have significantly increased public awareness about SBS (Dias et al., 2005). However, Dias et al., (2005) calls attention to the idea that the role of prevention might be not to educate the general public but to remind the right people at the right time. Given the support for increased knowledge to prevent SBS provided by findings of this research, nurses need to advocate for school-based programs as a way to educate adolescents. Advocacy for State and National mandated school-based education prevention programs is critical in this endeavor. In addition, incorporating mandated education in all certified babysitter programs can also serve as an additional reminder.

Although the effectiveness of this intervention has not been examined in younger children, it needs to be since SBS education is also currently mandated in the State of Wisconsin between grades 5 and 8. Given that 14.9 million children attend high school (U.S. Department of Education, 2009), such an intervention can reach most future parents and current babysitters. It is apparent that once a state wide public school educational program is initiated, essentially every future parent will be educated while saving substantial direct and indirect costs related to the aftermath of shaking a baby.

### **Implications for Vulnerability/Vulnerable Populations**

According to King et al., and The Canadian Shaken Baby Study Group (2003) further work is required to establish the true incidence of SBS, identify vulnerable children and to develop and evaluate prevention strategies. Frustration from a child's incessant crying has been described prolifically within the literature as the most common event leading to severe shaking (American Red Cross, 2007; Barlow & Minns 2000; Blumenthal, 2002; Chadwick, 1984; Dias et al., 2005; Jenny et al., 1999; Kirschner & Stein, 1985; Lazoritz & Palusci, 2001; Levin, 2003; Reece, 2001, 2004; Showers, 1992, 1994 & 1997). The most recent study completed by Barr et al., (2009) which showed knowledge change and some behavior change offers promising support that knowledge change can lead to future behavior change related to the prevention of SBS.

As documented in the literature, the perpetrators in SBS cases are almost always intrafamily and predominately males (Dias et al., 2005; Lazoritz & Palusci, 2001; Showers, 1997). People who have admitted to shaking a child reportedly have not done so out of hatred nor was the event planned (Lazoritz et al., 1997; Showers, 1997). Rather, they became frustrated with a baby's crying and lashed out (Lazoritz et al., 1997; Showers, 1997). A frustrating situation with a crying baby coupled with a lack of SBS knowledge can certainly detrimentally change the lives of both the child and themselves.

### **Strengths and Limitations**

The strengths of this study include its qualification for a true experiment, where a control group and randomization by classroom were used. This method prevents diffusion of the intervention to the control group. Significant results related to increased SBS knowledge change were achieved.

Despite the results, limitations included a predominance of African American and or black population, however, according to the literature race has little effect on the act of shaking a baby (Lazoritz & Palusci, 2001). The study was also limited as blinding of the data collector was not possible as the researcher collected all the data and provided the intervention. Future studies with masking of data collectors are advised. The most conservative tests were used in view of these limitations.

### **Future Research Suggestions**

Decreasing mortality and morbidity associated with SBS is achievable through early prevention education (Fulton, 2000) and is the ultimate goal. The NCSBS (2007) clearly states that SBS is 100% preventable. Implementing and testing a primary school-based program would incorporate the majority of adolescents that not only have the intent to baby-sit but will help prepare them as future parents on how to handle a crying baby.

Research is recommended to examine knowledge change over time measured by a behavior change. For example, after the intervention group receives the education, the next semester or the next school year those participants would then carry an infant simulator as part of a class. In addition, a control group who did not receive the intervention also would carry a simulator. Knowledge change can then be examined between groups through a difference in behavior or the number of times, if any, the simulator was shaken. This simulator approach would also allow masking as to intervention and control group.

This research was the first in which a quantitative instrument has been used to examine effectiveness of an SBS prevention program. However, since the USBS-13 was developed and tested with the Realityworks® (2009) SBS Simulator™ and curriculum,



the instrument could also be used to examine the effectiveness of other SBS prevention programs. Similarly, if additional instruments are developed relative to prevention of SBS, the Realityworks® (2009) program could be examined with those new instruments.

Attitude and self-efficacy also could be examined relative to prevention programs after instruments are developed to measure those constructs. Population level incidence of SBS could also be examined before and after statewide implementation of shaken baby prevention programs.

For that reason, congruent with the Dias et al., (2005) findings a commitment to prevention education regarding SBS is essential. Curriculums should be kept within Wisconsin law and made available to all middle and high school students to either serve as an initial primary prevention initiative or as a reminder to previous knowledge. This is not only for their immediate use of the information, but for future reference as they become parents.

## **Conclusion**

Each chapter of this dissertation has included relevant information about shaken baby syndrome, including previous research and pertinent clinical observations. The findings of this study demonstrate the effectiveness of a school-based educational program in changing knowledge to prevent shaken baby syndrome.

It is critical that those who interact with children and families work in conjunction with policymakers, educators, social service workers, and community leaders to clearly articulate a stand against violence toward children. And as more states become dedicated to the prevention of shaken baby syndrome through school-based educational programs,

the examination of these programs is imperative. Knowledge regarding SBS and its outcomes is the gateway to prevention.

## Appendix A

### Studies Related to the Incidence of Shaken Baby Syndrome

Author	Number of Children Studied	Number of Children with evidence of shaking	Age	Outcome
Alexander, Sato, Smith & Bennett (1990)	32	24	3 1/2 to 59 weeks	Intracranial injuries attributed to shaking.
Barlow & Minns (2000)	4065	Non-accidental head injury accounted for 82%	Average 5.1 months old	The incidence of subdural hematoma was 21 per 100,000 children younger than one year of age; it was estimated that the risk of a child suffering non-accidental head injury by age one year is one in 4065 children
Becker, Liersch, Tautz, Schlueter & Andler (1998)	4 pairs of twins	5	Under 12 months of age	Five of the eight children who suffered shaken baby syndrome, shaking was admitted in three of the children
Brown & Minns (1993)	30	17 (57%) shaking alone 13 (43%) shaking and impact	24 months and younger	Intracranial injuries
DiScala, Sege, Li & Reece (2000)	1997 cases of abuse and 16,831 unintentionally injured children	1997 cases of abuse	Under the age of 5	The median age was 8 months, however, of interest; the median age for the accidental injury was 28 months and 53% of the abused children had a previous medical history compared with only 14.1% of accident victims
Gilliland & Folberg (1996)	169 deaths	48%	Less than one old	169 deaths
Hadley, Sonntag, Rekate & Murphy (1989)	21	13 (36%)	Less than one year of age	8 of the 13 died
Jayawant, Rawlinson, Gibbon, Price, Schulte, Sharples, Sibert & Kemp (1998)	33	33	Under the age of 2	Nine infants died, 15 had profound disability and the remaining nine were reported as normal after one year
Lazoritz, Baldwin & Kini (1997)	71	71	Less than 36 months old	Shaking was admitted in eleven (12.7%). No explanation given in 24 (33.8%). Falls or head impacts reported in the remainder

## Appendix A (cont.)

### Studies Related to the Incidence of Shaken Baby Syndrome

Author	Number of Children Studied	Number of Children with evidence of shaking	Age	Outcome
Maxeiner (2001)	10	10	Under the age of 18 months	Four had no external or internal injuries on the face or head
McClelland, ReKate, Kaufman & Persse (1980)	21	6	5 ½ months old	Examined 21 children with cerebral injury as a result of child abuse. Shaken baby syndrome was suspected in six of these children, with a median age of 5 1/2 months.
Morris, Smith, Cressman & Ancheta (2000).	400 cases of alleged physical abuse in 1997	19 were possible child abuse cases	Under the age of 5 years old	32 children with intracranial hemorrhage (subarachnoid, epidural and subdural)
Smith, Hanson & Noble (1974)	47	38	24 months old and younger	30 subdural hemorrhages, nine subarachnoid hemorrhages and eight cerebral hemorrhages
Tzioumi & Oates, 1998	38	Non-accidental injury in 55% of cases, accidents in 39% and non-traumatic causes (6%) made up the remainder.	Under the age of 2 years old	Non-accidental injury is the most common cause of subdural hematomas in children under 2 years of age.

## **Appendix B**

### **Assumptions and Theoretical Propositions of the Health Promotion Model**

**(Pender et al., 2002, p. 63-64)**

The HPM is based on the following assumptions, which reflect both nursing and behavioral science perspectives:

1. Persons seek to create conditions of living through which they can express their unique human health potential.
2. Persons have the capacity for reflective self-awareness, including assessment of their own competencies.
3. Persons value growth in directions viewed as positive and attempts to achieve a personally acceptable balance between change and stability.
4. Individuals seek to actively regulate their own behavior.
5. Individuals in all their bio-psychosocial complexity interact with the environment, progressively transforming the environment and being transformed over time.
6. Health professionals constitute a part of the interpersonal environment, which exerts influence on persons throughout their lifespan.
7. Self-initiated reconfiguration of person-environment interactive patterns is essential to behavior change.

These assumptions emphasize the active role of the client in shaping and maintaining health behaviors and in modifying the environmental context for health behaviors.

## **Appendix B (cont.)**

### **Assumptions and Theoretical Propositions of the Health Promotion Model**

Theoretical statements derived from the model provide a basis for investigative work on health behaviors. The Health Promotion Model is based on the following 14 theoretical propositions:

1. Prior behavior and inherited and acquired characteristics influence beliefs, affect, and enactment of health-promoting behavior.
2. Persons commit to engaging in behaviors from which they anticipate deriving personally valued benefits.
3. Perceived barriers can constrain commitment to action, a mediator of behavior as well as actual behavior.
4. Perceived competence or self-efficacy to execute a given behavior increases the likelihood of commitment to action and actual performance of the behavior.
5. Greater perceived self-efficacy results in fewer perceived barriers to a specific health behavior.
6. Positive affect toward a behavior results in greater perceived self-efficacy, which can in turn, result in increased positive affect.
7. When positive emotions or affect are associated with a behavior, the probability of commitment and action is increased.

## **Appendix B (cont.)**

### **Assumptions and Theoretical Propositions of the Health Promotion Model**

8. Persons are more likely to commit to and engage in health-promoting behaviors when significant others model the behavior, expect the behavior to occur, and provide assistance and support to enable the behavior.
9. Families, peers, and health care providers are important sources of interpersonal influence that can increase or decrease commitment to and engagement in health-promoting behavior.
10. Situational influences in the external environment can increase or decrease commitment to or participation in health-promoting behavior.
11. The greater the commitment to a specific plan of action, the more likely health-promoting behaviors is to be maintained over time.
12. Commitment to a plan of action is less likely to result in the desired behavior when competing demands over which persons have little control require immediate attention.
13. Commitment to a plan of action is less likely to result in the desired behavior when other actions are more attractive and thus preferred over the target behavior.
14. Persons can modify cognitions, affect, and the interpersonal and physical environment to create incentives for health actions.

**Appendix B (cont.)****Reproduction Permission**

Thursday October 22, 2009 12:36 pm  
From: Nola Pender "npender@umich.edu"  
To: Margaret K. Stelzel "hca1@execpc.com"

Dear Margaret:

Your dissertation sounds like a very worthwhile project that has already had impact. You are to be commended for your influential work. You have my permission to reproduce in your dissertation the Health Promotion Model and related materials. An electronic copy of the model can be found at:

[www.nursing.umich.edu/faculty/pender\\_nola.html](http://www.nursing.umich.edu/faculty/pender_nola.html)

Wishing you good health.

Nola Pender

To: Nola Pender "npender@umich.edu"  
From: Margaret K. Stelzel "hca1@execpc.com"

Dear Dr. Pender,

Good Morning. I am a graduate student at Marquette University working on my dissertation. My dissertation subject is shaken baby syndrome and its prevention. I specifically tested an educational intervention to test the reliability and validity regarding knowledge change about prevention. Given there is no specific framework regarding knowledge change, in part, I utilized your Health Promotion model, specifically the assumptions and theoretical propositions, as a reference looking at health promotion and how people change and learn and adopt new health promotion behaviors. I did reference your assumptions and theoretical perspectives in my appendices. I want to be sure that before I reproduce this I have your permission to put it in my appendix. Please let me know if this is acceptable with you. If you have any questions, you may contact my Chair, Marilyn Frenn at Marquette at [marilyn.frenn@marquette.edu](mailto:marilyn.frenn@marquette.edu) or me. I would need your written permission to place in my appendices for purposes of electronic submission. I did achieve statistical significance. The reason why I chose this subject is that I was instrumental in getting law passed here in Wisconsin in 2005 regarding public instruction about SBS prevention. And I wanted to assure that the information and curriculum available was actually doing what it was suppose to be doing. This is a first study of its kind and I am very proud of it. I hope it sparks others to research this very devastating and necessary topic. Thank you for your time and I look forward to hearing from you. My research question specifically is "Is a school-based educational program effective in changing knowledge regarding shaken baby syndrome prevention?" Thank you again.

Margaret K. Stelzel, RN, PhD(c)



## Appendix C

### Findings: 15 Adolescent Health Promotion Model Based Studies

Author/Date	n=	Setting	Purpose of Study	Results	Conceptual Model(s)/ Framework(s)
Allen, Taylor & Kuiper (2007)	10 adolescents between 13 and 15 years of age	Fast food restaurant based	The purpose was to examine fast food choices, as was the ability to theoretically change dining choices in a simulated situation.	Overall, providing education about nutrition did have a short-term positive impact on the food choices in this setting and with this population.	Pender's HPM (2002)
Ammouri, Harsohena, Neuberger, Gajewski & Choi (2004)	300 adolescents ages 10-19 years	Community	The purpose of this secondary analysis study was to determine correlates of exercise participation among adolescents' ages 10 to 19 years.	Male adolescents reported higher exercise participation (M = 35.98) than female adolescents (M = 31.17) (t = -2.47, (p < .05).	Pender's HPM (2002)
Baker (2003)	297 Yemeni American adolescents; ages ranging from 14-18 years	School-based and teen's health clinic	To examine parental tobacco use and its relationship to peer influence, self-esteem, and tobacco use among Yemeni American adolescents.	The amount of variance accounted for was 39.0%. For the narghile model, only experimentation with tobacco use had a positive significant effect on narghile use. The amount of variance accounted for was 24.0%.	Pender's HPM (2002)
Barrett, Dunkin & Shelton (2001)	5408 children	Home	To examine relationships between pets and asthma-related symptoms.	Even though cats and dogs are commonly thought to contribute to asthma symptoms, this study found rodents and rabbits to be culpable.	Pender's HPM (2002)
Callaghan (2005)	256 high school students ages 14-19	School-based	To identify relationships among these concepts as well as the specific influence of spiritual growth, a component of health-promoting self-care behaviors, on self-care agency.	A correlation of .95 (p < .000) accounting for 90% of the variance explained.	Pender's HPM (1996), Bandura's Social Cognitive Theory (1997), and Orem's Self-Care Deficit Nursing Theory (2001)
Callaghan (2006)	256 adolescents	School-based	To identify influences of selected basic conditioning factors on the practice of healthy behaviors, self-efficacy beliefs, and ability for self-care.	The results identified significant relationships between basic conditioning factors and adolescents' practice of healthy behaviors, self-efficacy of those behaviors, and self-care abilities: support system, adequate income, adequate living conditions, gender, routine practice of religion, and reported medical problems/ disabilities.	Pender's HPM (2002), Bandura's Self-Efficacy Theory (1997), and Orem's Self-Care Deficit Nursing Theory (2001)

## Appendix C (cont.)

### Findings: 15 Adolescent Health Promotion Model Based Studies

Author/Date	n=	Setting	Purpose of Study	Results	Conceptual Model(s)/ Framework(s)
Calvert & Bucholz (2008)	602 adolescents 52% female 51% Black, aged 13 to 19	Community based	Risky behaviors and alcohol use	Compared to non-drinkers, drinkers were significantly more likely to have had unprotected sexual intercourse, use marijuana, and smoke cigarettes.	Pender's HPM (2002)
Chandanasothi (2003)	1,072 adolescents in Bangkok, Thailand	School-based	To describe relationships of stress, self-esteem and coping styles to health promoting behaviors of adolescents in Thailand.	The findings showed significantly positive relationships between adolescents' health promoting behaviors and (a) self-esteem and (b) coping styles. There were significantly negative relationships between stress and health promoting behaviors. The findings also revealed that self-esteem had the highest correlation with health promoting behaviors, followed by coping styles and stress, and accounted for 25% of variance.	Lazarus and Folkman's (1984) concept of stress and Pender's HPM (2002)
Chen, James, Hsu, Chang, Huang & Wang (2005)	37 adolescent mothers living in the rural area of Taoyuan, Taiwan who were below the age of 18. Identified by public health nurses.	Community through the public health department	To explore health-related behaviors among adolescent mothers living in the rural area of Taoyuan, Taiwan.	Revealed a pattern of economic disadvantage. Nearly half of the participants still lived with their biological parents. Two-thirds needed economic support from their parents (generally coming from their biological mother). Thirty-five percent of participants reported never using contraceptives, two-thirds had never had a Pap smear, and 44% did not breast-feed their infants. Nearly 60% of the children were cared for by the biological mothers of the participants.	Pender's HPM (Pender & Barkaskas, 1992) Orem's self-care deficit theory (Orem, Taylor, & Renpenning, 1995)
Deenan (2003)	Three hundred eleven bilingual Thai adolescents	Community	To understand exercise behavior in Thai adolescents.	Adolescents' decline in exercise results in higher rates of overweight and obesity and they become health threats in adolescents' later lives.	Pender HPM (2002)
Morowatisharifabad & Shirazi (2007)	300 pre-university students from 6 high schools in the Yazd district in central Iran	School-based	This study examined the relationships among behavior-specific cognitions and oral health behaviors.	Behavior specific cognitions and affect had a direct effect on oral health behaviors. Self-efficacy had an indirect effect on oral health behaviors through perceived barriers. Together, the variables accounted for 32% of the variance.	Pender's HPM (2002)

## Appendix C (cont.)

### Findings: 15 Adolescent Health Promotion Model Based Studies

Author/Date	n=	Setting	Purpose of Study	Results	Conceptual Model(s)/ Framework(s)
Phuphaibul, Thanooruk, Leucha, Sirapo-Ngam & Kanobdee, (2005)	1,980 adolescents	School-based	To examine the relationship between adolescent health promotion behavior, family health promotion behavior, and parent modeling.	This study suggested the roles of parent's health behaviors and family health behaviors on adolescent health behaviors are significant.	Pender's HPM (2002)
Sapp (2003)	99 adolescents with asthma, majority of the sample was white (64.6%); an approximately equal number were male and female (48.5% and 51.5%, respectively); and their mean age was 14.3	Primary care center	To examine selected personal characteristics and health promoting lifestyle behaviors that influence the health related quality of life of adolescent with asthma.	Revealed three of the six predictor variables (age, perceived severity of asthma, and health promoting lifestyle behaviors) accounted for 32% of the total variance for health related quality of life.	Pender's HPM (2002)
Wang, Wang, Tung & Peng (2007)	442 high school students	School-based	To examine factors influencing high school students' Environmental Tobacco Smoke (ETS) avoidance behavior.	Attitudes toward ETS, ETS avoidance efficacy, having family/friends smoke around oneself, the school system, and personal smoking status were the significant factors related to subjects' ETS avoidance behavior ( $R^2 = 56.1\%$ ). Attitude toward ETS was the crucial factor that explained 48.8% of ETS avoidance behavior.	Pender's HPM (2002)
Warner (2000)	A non-probability sample of 84 same-sex twins (n = 168) and their parents (84 mothers/65 fathers)	School-based	To examine the relationship between parental role modeling of leisure-time activity (LTA), the frequency of school-based physical education (PE), and the level of LTA.	No significant association between parental role modeling of LTA (as measured by sedentary/active patterns) nor the frequency of PE to the LTA of the children/adolescents.	Pender's HPM (1996)

## Appendix D

## Knowledge Change Studies

Author	Sample	Purpose	Design	Outcomes	Knowledge Change Behavior Change
Barnet & Hurst (2003)	1 <sup>st</sup> Evaluation: 271 students	Evaluation of an abstinence-only sexuality education program.	1 <sup>st</sup> Evaluation Pre-test-post-test	1 <sup>st</sup> Evaluation: "There was a time effect, $F(1, 233) = 166.85, p < .0001$ , with students scoring higher on the post-test than the pre-test (p. 266). There also was a program effect, $F(1, 233) = 35.24, p < .0001$ , with 10th graders scoring higher than eighth graders. Finally, there was significant program by time interaction, $F(1, 233) = 17.62.31, p < .0001$ " (p. 266).	1 <sup>st</sup> Evaluation: Knowledge Change: Yes  Behavior Change: No
	2 <sup>nd</sup> Evaluation: 86 students		2 <sup>nd</sup> Evaluation: Quasi-experimental	2 <sup>nd</sup> Evaluation: Clear differences were found for knowledge about sex, $F(1, 81) = 7.38, p = .008$ (p. 267).	2 <sup>nd</sup> Evaluation: Knowledge Change: Yes  Behavior Change: No
Fowler (1991)	83 youths ages 14 to 17 years was selected from a metropolitan, mid-western high school.	examined the influence of a seven-week Health Education Program on reported risky health behaviors	Pre-test-post-test	A positive shift in several reported health behaviors from high-risk to low-risk. It was suggested by the author that the reported health behaviors had a positive shift due to a knowledge change.	Knowledge Change: Yes  Behavior Change: Yes
Kinsler, Sneed, Morisky & Ang (2004)	150 students from six schools in Belize City. 75 students received the intervention and 75 students served as controls.	Evaluated a school-based intervention for human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS)	Pre-test-post-test	The intervention group showed higher HIV knowledge, was more likely to report condom use and was more likely to report future intentions to use condoms than the students in the control group	Knowledge Change: Yes  Behavior Change: Reported intent but not evaluated

## Appendix D (cont.)

## Knowledge Change Studies

Author	Sample	Purpose	Design	Outcomes	Knowledge Change Behavior Change
Kristjansson, Helgason, Mansson-Brahme, Widlund-Ivarson & Ullen (2003)	184 adolescents, ages 13 to 15	Studied the effective-ness of the educational material 'You and Your Skin'	Pre-test-post-test	The intervention increased the students' knowledge of known risks factors for skin cancers.	Knowledge Change: Yes Behavior Change: No
Ma, Lan, Edwards, Shive & Chau (2004)	161 Asian American youth	Evaluation of the effective-ness of a culturally tailored smoking prevention program.	Pre-test-Post-test	Post-test results revealed a significant increase in mean scores for knowledge related to tobacco use (4.1, $p < .05$ ).	Knowledge Change: Yes Behavior Change: No
1 <sup>st</sup> Phase McBride, Midford, Farringdon & Phillips (2000)	1 <sup>st</sup> Phase 13-17 year-olds in Perth, Western Australia; 1,111 students were in the intervention group and 1,232 were in the control group.	1 <sup>st</sup> Phase Studied the School Health and Alcohol Harm Reduction Project (SHAHRP) that aims to reduce alcohol-related harm.	1 <sup>st</sup> Phase Pre-test-post-test	1 <sup>st</sup> Phase The results indicated that despite knowledge change, this did not predict later knowledge nor did it predict change in behavior.	1 <sup>st</sup> Phase Knowledge Change: Yes Behavior Change: No
2 <sup>nd</sup> Phase McBride & Farringdon (2000)	2 <sup>nd</sup> Phase Same	2 <sup>nd</sup> Phase Same	2 <sup>nd</sup> Phase Same	2 <sup>nd</sup> Phase The SHAHRP program had an impact on alcohol related knowledge and behaviors early in the programs with some maintenance of impact one year later.	2 <sup>nd</sup> Phase Knowledge Change: Yes Behavior Change: Yes
Ostfeld, Esposito, Straw, Burgos & Hegyi (2005)	810 students grades 4 – 12.	Evaluation of the effective-ness of an educational program related to risk factors for sudden infant death syndrome (SIDS).	Pre-test-post-test	Students receiving the school-based health education program demonstrated more awareness of health risks related to SIDS and they also exceeded SIDS knowledge of baseline parents	Knowledge Change: Yes Behavior Change: Unknown
Portzky & van Herringen (1996)	14-18 year olds	Suicide Prevention	Interventional study	A positive effect on knowledge was identified and an interaction effect of the program with gender on attitudes was also found.	Knowledge Change: Yes Behavior Change: No
Robinson, Vander Weg, Riedel, Klesges & McLain-Allen (2003)	261 adolescent cigarette smokers (166 male, 95 female) averaging 15.8 years of age participated who were caught smoking.	Examined the feasibility, acceptability, and effectiveness of a school based smoking cessation program.	Pre-test-post-test		Knowledge Change: Yes Behavior Change: No

## Appendix D (cont.)

## Knowledge Change Studies

Author	Sample	Purpose	Design	Outcomes	Knowledge Change Behavior Change
Sussman, Dent, Craig, Ritt-Olsen & McCuller (2002)	288 students; 55% male, 34% White, 49% Latino, 4% Asian American, 9% African American, 3% Native American.  Age range 14 to 19 years.	Described the development and immediate impact of a self-instruction drug abuse prevention program called "Project Towards No Drug Abuse" (TND).	Pre-test-Post-test	There were effects on knowledge change overall [time by condition effect $F(2,569) = 4.69, p < .01$ ].	Knowledge Change: Yes  Behavior Change: Unknown
Wan and Bateman (2007)	204 British adolescents	Examined baseline knowledge of and self-reported intimate partner violence.	Pre-test-post-test	At baseline, 36% mostly or totally agreed that violence is bound to occur in a relationship and a third of the boys reported that it is acceptable to hit a female partner in certain situations (Wan & Bateman, 2007). Eleven per cent of the girls who had a partner reported that they had been physically victimized (Wan & Bateman, 2007). Following the intervention, adolescents in the intervention group had better knowledge of partner violence but little behavior change was found.	Knowledge Change: Yes  Behavior Change: No

## Appendix E

### Behavior Change Studies

Author	Sample	Purpose	Design	Outcomes	Knowledge Change / Behavior Change
Daly, Ziegler & Goldstein (2004)	17 girls ages 14 to 17 (mean age = 16.2), of whom 6 were African American, 6 Caribbean, and 5 Latino  90% of those invited joined the group sessions.	Adolescents were given an opportunity to integrate the experience of pregnancy and the abortion decision into their lives at a mental health clinic.	Post-abortion counseling group	Three months later, at follow up, adolescents who participated in the post-abortion counseling group indicated that they chose and used a method of birth control, did not repeat an unplanned pregnancy, and remained in high school,	Knowledge Change: Yes  Behavior Change: Yes, at 3 months
Fisher, Fisher, Bryan & Misovich (2002)	(n=1,532, primarily 9th-grade students)	assessed the effects of three theoretically grounded, school-based HIV prevention interventions	quasi-experimental controlled trial comparing classroom-based, peer-based, and combined classroom- and peer-based HIV prevention interventions with a standard-of-care control condition	At 12 months post-intervention, the classroom-based intervention resulted in sustained changes in HIV prevention behavior (Fisher et al., 2002). However, the interventions involving peers were less effective than the classroom-based intervention at the 12-month follow-up.	Knowledge Change: Yes  Behavior Change: Yes, at 12 months
Fritz (2003)		Evaluated the Computerized Adolescent Smoking Cessation Program	Pre-test-post-test	There was an increase the number of quit attempts with the intervention group but did not affect the duration of the attempts for the intervention or control subjects. Nicotine dependence and number of cigarettes smoked daily was significantly decreased for the intervention vs. the control subjects.	Knowledge Change: Yes  Behavior Change: No
Hamilton, Cross, Resnicow & Hall (2005)	4636 adolescents from 30 Western Australian government metropolitan high schools.	Compared the impact of a school-based harm minimization smoking intervention to the traditional abstinence-based approaches.	School-based cluster randomized trial	20 months post-baseline, the intervention students were less likely to smoke regularly [OR = 0.51, 95% confidence interval (CI) = 0.36, 0.71] or to have smoked within the previous 30 days (OR = 0.69, 95% CI = 0.53, 0.91).	Knowledge Change: Yes  Behavior Change: Yes, after 20 months
Portzky & van Herringen (1996)	14-18 year olds	Suicide Prevention	Interventional study	A positive effect on knowledge was identified and an interaction effect of the program with gender on attitudes was also found.	Knowledge Change: Yes  Behavior Change: No

## Appendix E (cont.)

### Behavior Change Studies

Author	Sample	Purpose	Design	Outcomes	Knowledge Change / Behavior Change
Stewart, Carter, Drinkwater, Hainsworth & Fairburn (2001)	Girls aged 13-14 years received the program as part of their normal school curriculum and An assessment-only control group included 386 pupils.	Evaluated the effectiveness of a school-based eating disorder prevention program	Interventional study with a intervention group and control group	This prevention program did show knowledge and behavior change, although the behavior change was modest in size and not sustained over time.	Knowledge Change: Yes  Behavior Change: Small, but did not sustain over a 6 month period of time.



## Appendix F

### Author Permission Letter from Realityworks®

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---

2709 Mondovi Road  
PO Box 329  
Eau Claire, WI 54702-0329 USA  
715.830.2040  
800.830.1416  
[www.realityworks.com](http://www.realityworks.com)

September 22, 2009

Margaret K. Stelzel, RN, PhD(c)  
Health Care Associates, LLC  
P.O. Box 220  
Dousman, WI 53118

Margaret,

My name is Timm Boettcher President of Realityworks. Realityworks is pleased to allow you to use and reproduce our "Understanding Shaken Baby Syndrome" curriculum for your dissertation and to defend the study you conducted on our program.

If you have any questions or concerns please contact me at 715.858.7136 or by email at [tim.boettcher@realityworks.com](mailto:tim.boettcher@realityworks.com)

Regards,



Timothy A. Boettcher  
President  
[tim.boettcher@realityworks.com](mailto:tim.boettcher@realityworks.com)

## Appendix G

Qualitative Tool Developed by Realityworks® (2009)

# Understanding Shaken Baby Syndrome PRE-TEST

Name \_\_\_\_\_

1. What does SBS stand for?    S \_\_\_\_\_ B \_\_\_\_\_ S \_\_\_\_\_
  
2. What can happen to a baby when it is shaken?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
  
3. What signs (that you observe) might indicated that a baby has been shaken?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
  
4. Is there a situation that makes shaking a baby OK?    (Circle one) Yes No  
 Explain your answer.  
 \_\_\_\_\_
  
5. Even though mothers are typically the main caregivers, why are fathers or male partners more likely to shake a baby?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
  
6. Do you think parents are more patients with their own children or with the children of other people?  
 (Circle one)    Their own children    Children of other people  
 Explain your answer.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
  
7. Can a baby become a victim of SBS while in the care of a babysitter or a day care provider?  
 (Circle one) Yes No  
 Explain your answer.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

8. Who do you think is more patient with a baby – the parents or someone babysitting the child?

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9. Why do you think twins have a higher incidence of being shaken?

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10. What are some reason that babies cry?

Common Reasons

Less Common Reasons

<hr/>	<hr/>
<hr/>	<hr/>
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11. What are some things a person can do to avoid shaking a baby?

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12. A sick and crying baby can be very upsetting for any caregiver. Imagine that you have been up all night with a sick baby. You have gotten little or no sleep and you're tired. You are frustrated because no matter what you try, you can't make the baby stop crying. What do you think is the best way to handle this situation?

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## Appendix H

### Assent for Initial Instrument Development Study

Protocol Number: \_\_\_\_\_

MARQUETTE UNIVERSITY  
ASSENT FORM FOR RESEARCH PARTICIPANTS  
Instrument Development and Pilot Study



**Is a school-based educational program effective in changing knowledge regarding SBS?**

Principal Investigator: Margaret K. Stelzel, RN, MSN

We are doing a research study. A research study is a special way to find out about something. We want to find out if shaken baby syndrome education makes a difference in the knowledge of high school students and to develop an instrument to measure this difference. You will be one of approximately 60 participants in this research study.

You can be in this study if you want to. If you want to be in this study, you will be asked to complete two surveys, 14 questions each, at one to three different times, dependent upon which group you are randomly assigned to.

We want to tell you about some things that might happen to you if you are in this study. The information received regarding shaken baby syndrome may be sensitive in nature, as the effects of shaken baby syndrome include permanent injury and death. However, the survey you will complete to be part of this study is not likely to be upsetting.

We might also find out things that will help other children some day that will allow us to make the educational program better. We hope to learn what parts of the educational programs are effective and ways to improve them, so other children will benefit.

No one except the research team will know what you have said. All results will be reported as a summary without individual identification. The only time that we would break this rule would be if you tell us information that we think your parents need to know to be able to keep you or other people safe. For example, if you have been having serious thoughts about hurting yourself or others in some way, we would inform your parents.

Your parents have agreed to let you take part in this study, but it is your decision whether or not to be in the study. You do not have to be in this study if you do not want to. You can say "no" and nothing bad will happen. Your participation or not

Protocol Number: \_\_\_\_\_

in the research study will not impact your grades. If you say "yes" now, but you want to stop later, that is okay too. If something about the study bothers you, you can stop being in the study at any time. All you have to do is tell the researcher you want to stop. If there is anything you do not like about being in the study, you should tell us and if we can, we will try to change it for you.

If you have any questions about the study, you can ask the researcher. We will try to explain everything that is being done and why. Please ask us about anything you want to know.

If you want to be in this study, please sign and print your name.

I, \_\_\_\_\_, want to be in this research study.  
(print your name here)

\_\_\_\_\_  
Sign your name here

\_\_\_\_\_  
(Date)

\_\_\_\_\_  
Investigator signature

\_\_\_\_\_  
(Date)



## Appendix I

### Consent for Initial Instrument Development Study

Protocol Number: \_\_\_\_\_

MARQUETTE UNIVERSITY  
PARENT PERMISSION FORM  
Instrument Development and Pilot Study



#### Is a school-based educational program effective in changing knowledge regarding SBS?

Principal Investigator: Margaret K. Stelzel, RN, MSN

Your child has been invited to take part in this research study. Before you agree to allow your child to take part, it is important that you read and understand the following information. Participation is completely voluntary. Please ask questions about anything you do not understand before making up your mind whether or not to give consent for your child to take part.

#### PURPOSE:

I understand that the purpose of this research study is to find if shaken baby syndrome education makes a difference in the knowledge of high school students and to develop an instrument to measure this difference. I understand that my child will be one of approximately 60 participants in this research study.

#### PROCEDURES:

Your child will complete a demographic information sheet (age, gender, race) and 1 to 3 surveys of 14 questions each regarding shaken baby syndrome. This is dependent upon which group they will be put into. One group will receive the survey approximately two weeks apart for the development of the instrument. The second group will receive the survey before and after the education is done. The third group will receive two surveys, one at the start of the study and one after the second group receives the education.

The groups will be randomly assigned. For confidentiality reasons, your child's name will not be on the final report. Code numbers will be created for this study; information will link the names and code numbers and will be destroyed when the study is completed. This information will be kept in a locked room in a locked cabinet in the investigators' home office. No one will have access to this information except for the principal investigator.

#### DURATION:

I understand that my child will fill out 1 to 3 surveys at different times during the study. They will take approximately 5-10 minutes each. One group will receive the intervention, which will take approximately 30 minutes.

#### RISKS:

I understand that the risks related to being in the study include no more than my child would come across in everyday life. The information they will be given is required but may be sensitive; as the majority of children who are shaken are left with permanent injury and or death. However, the survey and education is not likely to be upsetting.

Initials: \_\_\_\_\_

Page 1 of 3

Date: \_\_\_\_\_

Protocol Number: \_\_\_\_\_

**BENEFITS:**

I understand that the benefits related to my child's participation in this study include receiving appropriate and correct information regarding shaken baby syndrome in a setting where they can ask questions. There is no direct benefit to your child being in the study, however, they may gain a better understanding of shaken baby syndrome and how it can be prevented. We hope to determine if the educational program is effective and ways to improve them, so other children will benefit.

**CONFIDENTIALITY:**

I understand that all information my child tells us in this study will be kept confidential. All my child's data will be assigned an arbitrary code number rather than using my child's name or other information that could identify my child. A card with my child's name and the code number will be used to return the correct survey to them the second time. Only the investigator will have access to these cards and they will be destroyed on completion of the study. I understand that the data will be destroyed by shredding paper documents and deleting electronic files one year after the completion of the study. All the information your child provides will be kept private. No one except the research team will know that your child has contributed to the study. All results will be reported in aggregate. The only time that we would break this rule would be if your child tells us information that we think parents need to know to keep their child or other people safe. For example, if your child has been having serious thoughts about hurting themselves or others, we would inform that child's parents. All this information will be kept in a locked room in a locked cabinet in the investigators' home office. No one will have access to this information except for the principal investigator. The final report will be shared with Wisconsin Heights School District in order to improve their educational interventions. I understand that the research records may be inspected by the Marquette University Institutional Review Board or its designees and (as allowable by law) state and federal agencies.

**VOLUNTARY NATURE OF TAKE PART:**

I understand that participating in this study is completely voluntary and that my child may withdraw from the study and stop participating at any time without penalty or loss of benefits to which my child is otherwise entitled. You may contact the researcher, Margaret K. Stelzel, RN, MSN at 414-852-3007 or write her at P.O. Box 220, Dousman, WI 53118 to withdraw your child's information at any time. The names with study IDs will be kept for seven years after the conclusion of the study. If the data is withdrawn there are no penalties or consequences to your child. Withdrawal from the study will be kept confidential.

Consent forms will be sent home with students following the explanation and a date provided for the return of the form. Whether or not consent is given, those returning the form will have their name placed in a drawing for the 4 theatre tickets. Those who complete both surveys will have their name placed in the drawing for the pizza gift certificate.

**CONTACT INFORMATION:**

If I have any questions about this research project, you can contact Margaret K. Stelzel, RN, MSN at 414-852-3007 or write her at P.O. Box 220, Dousman, WI 53118. If I have questions or



Initials: \_\_\_\_\_

Date: \_\_\_\_\_

Protocol Number: \_\_\_\_\_

concerns about my child's rights as a research participant, you can contact Marquette University's Office of Research Compliance at (414) 288-1479. If you wish to review a copy of the survey your child will complete as part of the research you may request this in the front office of the school.

I HAVE HAD THE OPPORTUNITY TO READ THIS PARENT PERMISSION FORM, ASK QUESTIONS ABOUT THE RESEARCH PROJECT AND AM PREPARED TO GIVE MY PERMISSION FOR MY CHILD TO PARTICIPATE IN THIS PROJECT.

\_\_\_\_\_  
Parent's Signature(s)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Parent's Name(s)

\_\_\_\_\_  
Researcher's Signature

\_\_\_\_\_  
Date





## Appendix J

### Demographic Form for Initial and Second Instrument Development Studies and Research Study

Protocol Number \_\_\_\_\_

#### Demographic Information:

##### Ethnicity:

- Hispanic or Latino - a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race.
- Not Hispanic or Latino

##### Race:

##### Check all that apply

- American Indian or Alaska Native - a person having origin in any of the original peoples of North or South America (including Central America), and who maintains tribal affiliation or community attachment.
- Asian - a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent, including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, or Vietnam.
- Black or African American - a person having origins in any of the black racial groups of Africa.
- Native Hawaiian or Other Pacific Islander - a person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific islands.

- White - a person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

**4. Gender:**

- M - Male
- F - Female

**5. Your Age:** \_\_\_\_\_

## **Appendix K**

### **Biographies of Experts**

#### **Randell Alexander, MD, PhD**

Randell Alexander is a Clinical Professor of Pediatrics at the University of Florida, College of Medicine, and a member of the International Advisory Board for the National Center on Shaken Baby Syndrome. He has been on the Committee on Child Abuse and Neglect for the American Academy of Pediatrics, and the boards of the American Professional Society on the Abuse of Children and Prevent Child Abuse America. Dr. Alexander has served on state child death review committees in Iowa and Georgia.

#### **Brian Holmgren, JD**

Brian Holmgren is an Assistant District Attorney General with the Davidson County District Attorney Generals Office in Nashville, Tennessee where he is team leader of the child abuse unit. Previously he served as an Assistant District Attorney in Kenosha County, Wisconsin for ten years where he directed their sensitive crimes unit. As a prosecutor, Mr. Holmgren has tried more than 250 jury trials and has handled hundreds of child abuse cases. Between November of 1995 and July 1999 Mr. Holmgren was a Senior Attorney with the American Prosecutors Research Institute's National Center for Prosecution of Child Abuse. During his tenure at the National Center on Shaken Baby Syndrome he was a frequent lecturer on child abuse topics at statewide and national conferences and acted as a consultant to the media, law enforcement, prosecutors and child abuse professionals throughout the country concerning issues of child maltreatment and sexually violent predators. Mr. Holmgren has previously served on the

Board of Directors of the American Professional Society on the Abuse of Children and is a former board member of the Wisconsin chapter of that organization. He currently serves on the International Advisory Board for the National Center on Shaken Baby Syndrome. Mr. Holmgren is the author of numerous articles and book chapters and is a contributing author and editor to the third edition of the National Center's highly acclaimed manual on the *Investigation and Prosecution of Child Abuse Cases*.

**Carole Jenny, MD, MBA**

Carole Jenny is the Director for the Child Protection Program at Hasbro Children's Hospital in Providence, Rhode Island. She served as past Chair of the Section of Child Abuse and Neglect of the American Academy of Pediatrics. She currently serves on the International Advisory Board for the National Center on Shaken Baby Syndrome. During years 2002 to 2008 she has authored or co-authored 15 articles and two books related to child maltreatment and or shaken baby syndrome.

**Alex Levin, MD, MHSC, FAAO, FRCSC**

Alex Levin serves as a Chair on the International Advisory Board for the National Center on Shaken Baby Syndrome and is a Staff Ophthalmologist at The Hospital for Sick Children in Toronto, Canada as well as a staff Pediatrician for the Suspected Child Abuse and Neglect Program and a Professor at the Departments of Pediatrics, Genetics, and Ophthalmology and Vision Sciences. Dr. Levin also serves as Director for Postgraduate Bioethics Education at the University of Toronto. He has authored numerous articles related to shaken baby syndrome and ophthalmic changes.

**Robert Reece, MD**

Robert Reece serves on the International Advisory Board of the National Center on Shaken Baby Syndrome. He is Clinical Professor of Pediatrics at Tufts University School of Medicine and Editor of *The Quarterly Child Abuse Medical Update*, a journal seeking to keep the multidisciplinary professional community informed of recent medical literature relevant to child abuse. Dr. Reece is Editor of the book *Child Abuse: Medical Diagnosis and Management*, the second edition released in March 2001. He is also the Editor of *Child Abuse Treatment: Common Ground for Mental Health, Medical and Legal Professionals* (2000). Dr. Reece has worked as a clinician, teacher and researcher in child maltreatment since the early 1970s; he has served on numerous governmental advisory boards and commissions relevant to child abuse and neglect. He was Program Chair for the Section on Child Abuse and Neglect of the American Academy of Pediatrics from 1992-1996 and then Chair of the Section from 1998-2002. He also served on the national boards and executive committees for the American Professional Society on the Abuse of Children, Prevent Child Abuse America and the National Children's Alliance. He was honored by the American Professional Society on the Abuse of Children as the Outstanding Professional in the Field of Child Abuse in 1997, by Tufts University as an "Outstanding Faculty Member 1998" and by the American Academy of Pediatrics with the Award of Outstanding Service to Maltreated Children in 2000. He is a founding member of the Helfer Society, an honorary society for child abuse physicians, and is named in all editions of the peer-reviewed book, Best Doctors in America. He has authored two books and seven articles related to child maltreatment from 2002 to 2008.

**Appendix L****USBS-12**

Protocol Number: \_\_\_\_\_

**Understanding Shaken Baby Syndrome  
PRE-TEST and POST-TEST****THERE IS ONLY ONE CORRECT ANSWER**

1. What does SBS stand for?
  - A. Some Babies Shaken
  - B. Shaken Baby Syndrome
  - C. Slamming Baby Syndrome
  - D. Smashing Baby Syndrome
  - E. None of the above
  
2. What can happen to a baby or young child when it is shaken?
  - A. Bleeding behind the eyes, blindness, and or broken ribs and long bones (arms and legs)
  - B. Loss of memory and emotion, speech and or hearing
  - C. Paralysis from bleeding around the brain and or learning disabilities
  - D. Death
  - E. All of the above
  
3. What might you see to be a sign that a baby or young child has been shaken?
  - A. Rolling eyes
  - B. Vomiting
  - C. Difficulty breathing and convulsions
  - D. Unconsciousness
  - E. All of the above
  
4. Is there a situation that makes shaking a baby or young child OK?
  - A. Yes
  - B. No
  - C. Sometimes
  - D. When he or she is not breathing
  - E. While playing

5. Even though mothers are typically the main caregivers, why are fathers or male partners more likely to shake a baby or young child?

- A. Men may not be used to a baby's or young child's crying
- B. Men may be less familiar with a baby's or young child's needs
- C. Men may have additional stresses, such as financial or family stresses
- D. Men may use force when frustrated
- E. All of the above

6. Do you think parents are more patient with their own children or with the children of other people?

- A. Their own children
- B. Children of other people
- C. There is no correct answer
- D. Their nieces and nephews only
- E. Their own children when they have help

7. Can a baby or young child become a victim of SBS while in the care of a babysitter or a day care provider?

- A. Any caregiver is at risk of shaking a baby or young child
- B. A baby or young child is only at risk of shaking while with someone they do not know
- C. A baby or young child is at risk of shaking while with someone they do know
- D. None of the above
- E. All of the above

8. Who do you think is more patient with a baby or young child—the parents or someone babysitting the child?

- A. Both types of caregivers are equally at risk for shaking a baby or young child.
- B. Parents know their children well and may forgive them easily, they are less at risk for shaking their child
- C. Parents can become stressed from the day in and day out care and are at more risk for shaking their child
- D. Babysitters may take pride in being professional and are less at risk for shaking a child
- E. Babysitters may not always be able to have the patience that a parent may have and are more at risk for shaking a child

9. Activities that DO NOT cause shaken baby syndrome

- A. The baby falling off furniture or a counter
- B. The baby being tossed up and caught
- C. The baby being bounced on an adult's knee
- D. The baby jerking in a car seat when a driver stops the car suddenly
- E. All of the above

10. What are some common reasons that babies cry?

- A. The baby or young child is hungry
- B. The baby or young child needs to burp
- C. The baby or young child needs a diaper change
- D. The baby or young child is tired
- E. All of the above

11. A sick and crying baby or young child can be very upsetting for any caregiver. Imagine that you have been up all night with a sick baby or young child. You have gotten little or no sleep and you are tired. You are frustrated because no matter what you try, you cannot make the baby or young child stop crying. What are some things a person can do to avoid shaking a baby or young child?

- A. Play music that soothes or distracts you
- B. Call a friend, neighbor or relative to talk, or to relieve you for a few minutes
- C. Remind yourself the crying will end
- D. Call a hotline or 911
- E. All of the above

12. SBS is:

- A. Form of punishment or neglect
- B. Always seen with visible bruises
- C. Caused by birth, CPR, or genetic disorders
- D. A form of child abuse that is preventable through education
- E. A pre-existing medical condition or disease



**Appendix M****USBS-27**

Protocol Number: \_\_\_\_\_

**Understanding Shaken Baby Syndrome  
PRE-TEST and POST-TEST****THERE IS ONLY ONE CORRECT ANSWER**

1. What does SBS stand for?
  - A. Some Babies Shaken
  - B. Shaken Baby Syndrome
  - C. Slamming Baby Syndrome
  - D. Smashing Baby Syndrome
  - E. None of the above
  
2. What can happen to a baby or young child when it is shaken?
  - A. Bleeding behind the eyes, blindness, and or broken ribs and long bones (arms and legs)
  - B. Loss of memory and emotion, speech and or hearing
  - C. Paralysis from bleeding around the brain and or learning disabilities
  - D. Death
  - E. All of the above
  
3. What might you see to be a sign that a baby or young child has been shaken?
  - A. Rolling eyes
  - B. Vomiting
  - C. Difficulty breathing and convulsions
  - D. Unconsciousness
  - E. All of the above
  
4. Is there a situation that makes shaking a baby or young child OK?
  - A. Yes
  - B. No
  - C. Sometimes
  - D. When he or she is not breathing
  - E. While playing

5. Even though mothers are typically the main caregivers, why are fathers or male partners more likely to shake a baby or young child?

- A. Men may not be used to a baby's or young child's crying
- B. Men may be less familiar with a baby's or young child's needs
- C. Men may have additional stresses, such as financial or family stresses
- D. Men may use force when frustrated
- E. All of the above

6. Do you think parents are more patient with their own children or with the children of other people?

- A. Their own children
- B. Children of other people
- C. There is no correct answer
- D. Their nieces and nephews only
- E. Their own children when they have help

7. Can a baby or young child become a victim of SBS while in the care of a babysitter or a day care provider?

- A. Any caregiver is at risk of shaking a baby or young child
- B. A baby or young child is only at risk of shaking while with someone they do not know
- C. A baby or young child is at risk of shaking while with someone they do know
- D. None of the above
- E. All of the above

8. Who do you think is more patient with a baby or young child—the parents or someone babysitting the child?

- A. Both types of caregivers are equally at risk for shaking a baby or young child.
- B. Parents know their children well and may forgive them easily, they are less at risk for shaking their child
- C. Parents can become stressed from the day in and day out care and are at more risk for shaking their child
- D. Babysitters may take pride in being professional and are less at risk for shaking a child
- E. Babysitters may not always be able to have the patience that a parent may have and are more at risk for shaking a child

9. Activities that DO NOT cause shaken baby syndrome

- A. The baby falling off furniture or a counter
- B. The baby being tossed up and caught
- C. The baby being bounced on an adult's knee
- D. The baby jerking in a car seat when a driver stops the car suddenly
- E. All of the above

10. What are some common reasons that babies cry?

- A. The baby or young child is hungry
- B. The baby or young child needs to burp
- C. The baby or young child needs a diaper change
- D. The baby or young child is tired
- E. All of the above

11. A sick and crying baby or young child can be very upsetting for any caregiver. Imagine that you have been up all night with a sick baby or young child. You have gotten little or no sleep and you are tired. You are frustrated because no matter what you try, you cannot make the baby or young child stop crying. What are some things a person can do to avoid shaking a baby or young child?

- A. Play music that soothes or distracts you
- B. Call a friend, neighbor or relative to talk, or to relieve you for a few minutes
- C. Remind yourself the crying will end
- D. Call a hotline or 911
- E. All of the above

12. SBS is:

- A. A form of punishment or neglect
- B. Always seen with visible bruises
- C. Caused by birth, CPR, or genetic disorders
- D. A form of child abuse that is preventable through education
- E. A pre-existing medical condition or disease

13. When a baby or young child has been shaken what physical signs might you see?

- A. Difficulty breathing
- B. Vomiting
- C. Convulsions
- D. None of the above
- E. All of the above

14. Parents are more patient with:

- A. Their own children
- B. Children of other people
- C. There is no correct answer
- D. Help when they are frustrated
- E. Nieces and nephews

15. A baby or young child can become a victim of SBS while in the care of...

- A. Their parents.
- B. Someone they do not know.
- C. Someone they do know.
- D. Any caregiver.
- E. All of the above

16. Activities that DO NOT cause shaken baby syndrome

- A. A baby falling off furniture or a counter
- B. A baby being bounced on an adult's knee
- C. A baby being tossed up in the air and caught
- D. None of the above
- E. All of the above

17. Shaken Baby Syndrome is:

- A. Caused by birth defects.
- B. A form of punishment or neglect.
- C. Always seen with visible bruises.
- D. A form of child abuse.
- E. A disease.

18. At what age are children at risk for being shaken?
- A. 1 year old
  - B. 6 months old or younger
  - C. 4 years old
  - D. 2 years old
  - E. All of the above
19. How long does it take to shake a baby?
- A. 1 minute
  - B. A few seconds
  - C. 4 minutes
  - D. 2 minutes
  - E. 5 minutes
20. Which of the following statements are true?
- A. SBS is a disease
  - B. 25% of all shaken babies die from their injuries
  - C. Most victims are over the age of 5
  - D. Twins are more protected from being shaken
  - E. Girls are more likely to be shaken than boys
21. Why is a baby so easily hurt?
- A. Because they have strong neck muscles
  - B. Because they are able to tell us what they need
  - C. They have a heavy head – 25% of their body weight
  - D. The brain is still developing
  - E. Both C and D
22. The #1 reason trigger why someone shakes a child is
- A. Loss of appetite
  - B. Sleeping
  - C. Laughing
  - D. Crying
  - E. None of the above

23. Is Shaken Baby Syndrome Preventable?
- A. Sometimes
  - B. Never
  - C. Only with your own children
  - D. Only if you love the child
  - E. Yes, through education
24. Why do babies' cry?
- A. Has colic
  - B. Has minor gas pains
  - C. Has a fever
  - D. Needs to be held and comforted
  - E. All of the above
25. Anyone who may become frustrated is capable of shaking a baby.
- A. Is a false statement
  - B. Is sometimes true
  - C. Is always false
  - D. Is true
  - E. None of the above
26. Shaken baby syndrome is
- A. A Preventable tragedy
  - B. An assault on a child
  - C. Often ruled homicide
  - D. None of the above
  - E. All of the above
27. Always remember
- A. No baby has died from crying
  - B. If someone calls you, frustrated with a crying baby, offer your help.
  - C. Never shake a baby
  - D. If you need help, call a hotline
  - E. All of the above

**Appendix N****USBS-20**

Protocol Number: \_\_\_\_\_

**PRE and POST-TEST  
Understanding Shaken Baby Syndrome****THERE IS ONLY ONE CORRECT ANSWER**

1. What can happen to a baby or young child when it is shaken?
  - A. Bleeding behind the eyes, blindness, and or broken ribs and long bones (arms and legs)
  - B. Loss of memory and emotion, speech and or hearing
  - C. Paralysis from bleeding around the brain and or learning disabilities
  - D. Death
  - E. All of the above
  
2. What might you see to be a sign that a baby or young child has been shaken?
  - A. Rolling eyes
  - B. Vomiting
  - C. Difficulty breathing and convulsions
  - D. Unconsciousness
  - E. All of the above
  
3. Is there a situation that makes shaking a baby or young child OK?
  - A. Yes
  - B. No
  - C. Sometimes
  - D. When the baby or young child is laughing
  - E. When you are angry
  
4. Even though mothers are typically the main caregivers, why are fathers or male partners more likely to shake a baby or young child?
  - A. Men may not be used to a baby's or young child's crying
  - B. Men may be less familiar with a baby's or young child's needs
  - C. Men may have additional stresses, such as financial or family stresses
  - D. Men may use force when frustrated
  - E. All of the above

5. Who do you think is more patient with a baby or young child—the parents or someone babysitting the child?

- A. Both types of caregivers are equally at risk for shaking a baby or young child.
- B. Parents are less at risk for shaking their child.
- C. Parents are at more risk for shaking their child.
- D. Babysitters are less at risk for shaking a child.
- E. Babysitters are more at risk for shaking a child.

6. Activities that DO NOT cause shaken baby syndrome

- A. The baby falling off furniture or a counter
- B. The baby being tossed up and caught
- C. The baby being bounced on an adult's knee
- D. The baby jerking in a car seat when a driver stops the car suddenly
- E. All of the above

7. What are some common reasons that babies cry?

- A. The baby or young child is hungry
- B. The baby or young child needs to burp
- C. The baby or young child needs a diaper change
- D. The baby or young child is tired
- E. All of the above

8. A sick and crying baby or young child can be very upsetting for any caregiver. Imagine that you have been up all night with a sick baby or young child. You have gotten little or no sleep and you are tired. You are frustrated because no matter what you try, you cannot make the baby or young child stop crying. What are some things a person can do to avoid shaking a baby or young child?

- A. Play music that soothes or distracts you
- B. Call a friend, neighbor or relative to talk, or to relieve you for a few minutes
- C. Remind yourself the crying will end
- D. Call a hotline or 911
- E. All of the above

9. SBS is:

- A. A form of child abuse that is preventable through education
- B. Always seen with visible bruises
- C. Caused by birth, CPR, and or genetic disorders
- D. A form of punishment or neglect
- E. A pre-existing medical condition or disease



10. A baby or young child can become a victim of SBS while in the care of...

- A. Their parents.
- B. Someone they do not know.
- C. Someone they do know.
- D. Any caregiver.
- E. All of the above

11. Activities that DO NOT cause shaken baby syndrome

- A. A baby falling off furniture or a counter
- B. A baby being bounced on an adult's knee
- C. A baby being tossed up in the air and caught
- D. None of the above
- E. All of the above

12. Shaken Baby Syndrome is:

- A. Caused by birth defects.
- B. A form of punishment or neglect.
- C. Always seen with visible bruises.
- D. A form of child abuse.
- E. A disease.

13. At what age are children at risk for being shaken?

- A. 1 year old
- B. 6 months old or younger
- C. 4 years old
- D. 2 years old
- E. All of the above

14. How long does it take to harm a baby by shaking them?

- A. 1 minute
- B. a few seconds
- C. 4 minutes
- D. 2 minutes
- E. 5 minutes

15. Which of the following statements are true?
- A. SBS is a disease
  - B. 25% of all shaken babies die from their injuries
  - C. Most victims are over the age of 5
  - D. Twins are more protected from being shaken
  - E. Girls are more likely to be shaken than boys
16. Why is a baby so easily hurt?
- A. Because they have strong neck muscles
  - B. Because they are able to tell us what they need
  - C. They have a heavy head – 25% of their body weight
  - D. The brain is still developing
  - E. Both C and D
17. The #1 reason trigger why someone shakes a child is
- A. Loss of appetite
  - B. Sleeping
  - C. Laughing
  - D. Crying
  - E. None of the above
18. Is Shaken Baby Syndrome Preventable?
- A. Sometimes
  - B. Never
  - C. Only with your own children
  - D. Only if you love the child
  - E. Yes, through education
19. Why do babies' cry?
- A. May be colic
  - B. May have minor gas pains
  - C. May have a fever or be sick
  - D. Needs to be held and comforted
  - E. All of the above

20. Anyone who may become frustrated is capable of shaking a baby.
- A. Is a false statement
  - B. Is sometimes true
  - C. Is always false
  - D. Is true
  - E. None of the above

**Appendix O**  
**Research Design Model**

Intervention 1	R	O1	X	O2	
Control Group	R	O1		O2	X

Key:

R = random assignment

O1 = Pre-test

O2 = Post-test

X = Intervention

## Appendix P

### Consent Form for Second Instrument Development Study and Research Study

Protocol Number: \_\_\_\_\_



MARQUETTE UNIVERSITY  
PARENT PERMISSION FORM  
Instrument Development and Study

**Is a school-based educational program effective in changing knowledge regarding prevention of Shaken Baby Syndrome?**

Principal Investigator: Margaret K. Stelzel, RN, MSN

Your child has been invited to take part in this research study. Before you agree to allow your child to take part, it is important that you read and understand the following information. Participation is completely voluntary. Please ask questions about anything you do not understand before making up your mind whether or not to give consent for your child to take part.

**PURPOSE:**

I understand that the purpose of this research study is to find if shaken baby syndrome education makes a difference in the knowledge of high school students and to develop an instrument to measure this difference. I understand that my child will be one of approximately 1040 participants in this research study. Up to five hundred and forty participants will be recruited for instrument development and 500 participants will be recruited for the study.

**PROCEDURES:**

Your child will complete a demographic information sheet (age, gender, race) and 2 surveys of up to 27 questions each regarding shaken baby syndrome. One group will receive the survey approximately two weeks apart for the development of the instrument. The second group will receive the survey before and after the education is done.

The groups will be randomly assigned. For confidentiality reasons, your child's name will not be on the final report. Code numbers will be created for this study; information will link the names and code numbers and will be destroyed when the study is completed. This information will be kept in a locked room in a locked cabinet in the investigators' home office. No one will have access to this information except for the principal investigator.

**DURATION:**

I understand that my child will fill out 2 surveys at different times during the study. They will take approximately 10-15 minutes each. My child will also receive the education about shaken baby syndrome, which will take approximately 30-45 minutes; however, the control group will receive the education after they take the second survey.

**RISKS:**

I understand that the risks related to being in the study include no more than my child would come across in everyday life. The information they will be given is required by law but may be sensitive; as the majority of children who are shaken are left with permanent injury and or death. However, the survey and education are not likely to be upsetting.

Initials: \_\_\_\_\_

Page 1 of 3

Date: \_\_\_\_\_

Protocol Number: \_\_\_\_\_

**BENEFITS:**

I understand that the benefits related to my child's participation in this study include receiving appropriate and correct information regarding shaken baby syndrome in a setting where they can ask questions. There is no direct benefit to your child being in the study, however, they may gain a better understanding of shaken baby syndrome and how it can be prevented. We hope to determine if the educational program is effective and ways to improve them, so other children will benefit.

**CONFIDENTIALITY:**

I understand that all of my child's information will be kept confidential. All of my child's data will be assigned an arbitrary code number rather than using my child's name or other information that could identify my child. A card with my child's name and the code number will be used to return the correct survey to them the second time. Only the investigator will have access to these cards and they will be destroyed on completion of the study. I understand that the data will be destroyed by shredding paper documents and deleting electronic files seven years after the completion of the study. All the information your child provides will be kept private. No one except the research team will know that your child has contributed to the study. All results will be reported in group form. The only time that we would break this rule would be if your child tells us information that we think parents need to know to keep their child or other people safe. For example, if your child has been having serious thoughts about hurting themselves or others, we would inform you. All this information will be kept in a locked room in a locked cabinet in the investigators' home office. No one will have access to this information except for the principal investigator. The final report will be shared with Milwaukee Public School District in order to improve their educational interventions. I understand that the research records may be inspected by the Marquette University Institutional Review Board or its designees and (as allowable by law) state and federal agencies.

**VOLUNTARY NATURE OF TAKE PART:**

I understand that participating in this study is completely voluntary and that my child may withdraw from the study and stop participating at any time without penalty or loss of benefits to which my child is otherwise entitled. You may contact the researcher, Margaret K. Stelzel, RN, MSN at 414-852-3007 or write her at P.O. Box 220, Dousman, WI 53118 to withdraw your child's information at any time. The names with study IDs will be kept for seven years after the conclusion of the study. If the data is withdrawn there are no penalties or consequences to your child. Withdrawal from the study will be kept confidential.

A consent form will be sent home with your child following an explanation of the research by the principal investigator. A date will be provided for the return of the form. Whether or not your child chooses to consent for this study, if your child returns the consent form, their name will be placed in a drawing for a \$25 gift certificate to Marcus Theatres, Pizza Hut and iTunes.

**CONTACT INFORMATION:**

If I have any questions about this research project, I can contact Margaret K. Stelzel, RN, MSN at 414-852-3007 or write her at P.O. Box 220, Dousman, WI 53118. If I have questions or



Initials: \_\_\_\_\_

Date: \_\_\_\_\_

Protocol Number: \_\_\_\_\_

concerns about my child's rights as a research participant, I can contact Marquette University's Office of Research Compliance at (414) 288-1479. If I wish to review a copy of the survey my child will complete as part of the research I may request this in the front office of the school.

I HAVE HAD THE OPPORTUNITY TO READ THIS PARENT PERMISSION FORM, ASK QUESTIONS ABOUT THE RESEARCH PROJECT AND AM PREPARED TO GIVE MY PERMISSION FOR MY CHILD TO PARTICIPATE IN THIS PROJECT.

\_\_\_\_\_  
Parent's Signature(s)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Parent's Name(s)

\_\_\_\_\_  
Researcher's Signature

\_\_\_\_\_  
Date



## Appendix Q

### Assent for Second Instrument Development Study and Research Study

Protocol Number: \_\_\_\_\_

MARQUETTE UNIVERSITY  
 ASSENT FORM FOR RESEARCH PARTICIPANTS  
 Instrument Development and Study



**Is a school-based educational program effective in changing knowledge regarding prevention of Shaken Baby Syndrome?**

Principal Investigator: Margaret K. Stelzel, RN, MSN

We are doing a research study. A research study is a special way to find out about something. We want to find out if shaken baby syndrome education makes a difference in the knowledge of high school students and to develop an instrument to measure this difference. You will be one of approximately 1040 participants in this research study.

You can be in this study if you want to. If you want to be in this study, you will be asked to complete two surveys, up to 27 questions each, at different times, depending on which group you are randomly assigned to.

We want to tell you about some things that might happen to you if you are in this study. The education about shaken baby syndrome may be sensitive in nature, as the effects of shaken baby syndrome include permanent injury and death. However, the survey you will complete to be part of this study is not likely to be upsetting.

We might also find out things that will help other children some day that will allow us to make the educational program better. We hope to learn what parts of the educational programs are effective and ways to improve them, so other children will benefit.

No one except the research team will know what you have said. All results will be reported as a summary without individual identification. The only time that we would break this rule would be if you tell us information that we think your parents need to know to be able to keep you or other people safe. For example, if you have been having serious thoughts about hurting yourself or others in some way, we would inform your parents.

Your parents have agreed to let you take part in this study, but it is your decision whether or not to be in the study. You do not have to be in this study if you do not want to. You can say "no" and nothing bad will happen. Your participation or not



Protocol Number: \_\_\_\_\_

in the research study will not impact your grades. If you say “yes” now, but you want to stop later, that is okay too. If something about the study bothers you, you can stop being in the study at any time. All you have to do is tell the researcher you want to stop. If there is anything you do not like about being in the study, you should tell us and if we can, we will try to change it for you.

Whether or not parental consent is given, for each study, if you return this form you will have your name placed in a drawing for a \$25 gift certificate to Marcus Theatres, Pizza Hut and iTunes.

If you have any questions about the study, you can ask the researcher. We will try to explain everything that is being done and why. Please ask us about anything you want to know.

If you want to be in this study, please sign and print your name.

I, \_\_\_\_\_, want to be in this research study.  
(print your name here)

\_\_\_\_\_  
Sign your name here

\_\_\_\_\_  
(Date)

\_\_\_\_\_  
Investigator signature

\_\_\_\_\_  
(Date)



## **Appendix R**

### **Specific Operations of SBS Simulator™**

**(Realityworks®, 2009)**

- When shaking causes the brain to reach the first level of acceleration, the red lights turn on over the occipital lobe of the brain to indicate injury. The occipital lobe controls vision.
- As shaking continues and the second level is reached, the red lights turn on in the front of the brain to indicate frontal injury. The frontal lobe controls memory and emotion.
- As the shaking continues and acceleration builds further, the third level is reached and the red lights turn on at the sides of the brain. At this point, injury to the brain would be extensive. Control over movement of the arms and legs are lost, the ability to speak is lost as well as cognitive processes are damaged. Injury this severe usually results in death.

## Appendix S

### My Plan to Manage Frustration Form

Developed by Realityworks® (2009)

# Understanding Shaken Baby Syndrome MY PLAN TO MANAGE FRUSTRATION

## When a Baby in My Care Can't Stop Crying

Name \_\_\_\_\_

1. When a baby or small child in my care cannot stop crying and I have tried changing, feeding, holding, and meeting the baby's other basic needs, I will try the following activities to help soothe her:

---



---



---

2. If the baby in my care cannot be soothed and my frustration is increasing, the baby will be safe if I put him in one of these places . . .

---



---



---

...and I can do a few of the following things for myself:

---



---



---

3. If I feel I need to talk to someone because of the stress of being with a crying baby, I can call these people:

---



---



---

4. If I need a break from being with the baby I'm caring for, I can call one of these people:

---



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## Appendix T

### Specific Procedures and Related Materials for Realityworks® (2009) Curriculum

**Activity 1: Pre-test-USBS-20**

Administered with the demographic form.

**Activity 2: SBS Simulator™ Demonstration**

In this activity, the instructor explains the basic operation of the SBS Simulator™ and uses the simulator to demonstrate the injuries a baby would receive from a shaking incident. Students learn the functions that are lost when those areas are injured and about other injuries that may accompany SBS.

**Activity 3: SBS Video and Discussion:**

This activity reinforces the information learned in Activity 2 and prepares students for the detailed information they will learn in Activity 4: Overhead Presentation. This activity includes the viewing of “Portrait of Promise,” a mid-length video (11 minutes) produced by The Junior League of St. Paul, Inc., Midwest Children's Resource Center. (Phone (651)220-6750)

**Activity 4: Overhead Presentation:**

During this activity, students learn facts and statistics about SBS and the injury sequelae. They also learn the reasons why babies are vulnerable to injury from shaking and how

to handle a crying or fussy baby. The overhead presentation power point is an electronic file available for download at

<http://www.realityworks.com/sbss>.

**Activity 5: Question and Answer Session with SBS Simulator™:**

This activity reinforces the information students learned in Activity 2 and Activity 4. The question and answer format in this activity is supplemented with the SBS Simulator™ so that students will recall the injury sequelae.

**Activity 6: My Plan to Manage Frustration:**

In this activity, students synthesize what they have learned and create a plan of action for frustration. See Appendix S for “My Plan to Manage Frustration” form.

**Activity 7: Post-test-USBS-20 and Pledge Not To Shake:**

This activity concludes the lesson. The USBS-20 post-test is administered and collected. The “Pledge Not to Shake” validates participation in the lesson and is available for download at <http://www.realityworks.com/sbss>.

## Appendix U

### Office of Research Compliance:

### Approval Letter for Initial Instrument Development Study

OFFICE OF RESEARCH COMPLIANCE

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November 28, 2007

Ms. Margaret Stelzel  
Nursing

Dear Ms. Stelzel:

Your protocol number HR-1533, titled, "*Pilot Study: Is a school-based educational program effective in changing knowledge regarding SBS?*" was expedited on November 28, 2007, by a member of the Marquette University Institutional Review Board.

Your IRB approved informed parent permission form and child assent form are attached to this letter. Use the stamped copies of these forms when recruiting research participants.

You are approved to recruit a total of 90 subjects. Any changes to your protocol must be requested in writing by submitting an IRB Protocol Amendment Form, which can be found at: <http://www.marquette.edu/researchcompliance/research/irbforms.shtml>. All changes must receive IRB review before being initiated, except when necessary to eliminate apparent immediate hazards to the human subjects. Any public advertising of this project requires prior IRB approval. If there are any adverse events, please notify the Marquette University IRB immediately.

Your approval is valid until November 27, 2008. Prior to this date, you will be contacted regarding continuing IRB review.

If you have any questions or concerns, please do not hesitate to contact me. Thank you for your time and cooperation.

Sincerely,



Amanda J. Ahrndt, RN, MS, MSN  
Research Compliance Analyst

cc: Dr. John Grych, IRB Chair  
Ms. Erin Fox, Graduate School  
Dr. Marilyn Frenn, Nursing

## Appendix V

### Office of Research Compliance:

### Approval Letter for Second Instrument Development and Research Study

OFFICE OF RESEARCH COMPLIANCE



February 18, 2008

Ms. Margaret Stelzel  
Nursing

Dear Ms. Stelzel:

Your protocol number HR-1569, titled, "*Is a school-based educational program effective in changing knowledge regarding prevention of Shaken Baby Syndrome?*" was expedited on February 14, 2008, by a member of the Marquette University Institutional Review Board.

Your IRB approved informed consent form and assent form are attached to this letter. Use the stamped copies of these forms when recruiting research participants.

You are approved to recruit a total of 1040 subjects. Any changes to your protocol must be requested in writing by submitting an IRB Protocol Amendment Form, which can be found at: <http://www.marquette.edu/researchcompliance/research/irbforms.shtml>. All changes must receive IRB review before being initiated, except when necessary to eliminate apparent immediate hazards to the human subjects. Any public advertising of this project requires prior IRB approval. If there are any adverse events, please notify the Marquette University IRB immediately.

Your approval is valid until February 13, 2009. Prior to this date, you will be contacted regarding continuing IRB review.

If you have any questions or concerns, please do not hesitate to contact me. Thank you for your time and cooperation.

Sincerely,

A handwritten signature in cursive script that reads "Amanda J. Ahmrdt".

Amanda J. Ahmrdt, RN, MS, MSN  
Research Compliance Analyst

cc: Dr. John Grych, IRB Chair  
Ms. Erin Fox, Graduate School  
Dr. Marilyn Frenn, Nursing

**Appendix W****USBS-13**

Protocol Number: \_\_\_\_\_

**Understanding Shaken Baby Syndrome****THERE IS ONLY ONE CORRECT ANSWER**

1. What can happen to a baby or young child when it is shaken?
  - A. Bleeding behind the eyes, blindness, and or broken ribs and long bones (arms and legs)
  - B. Loss of memory and emotion, speech and or hearing
  - C. Paralysis from bleeding around the brain and or learning disabilities
  - D. Death
  - E. All of the above
  
2. What might you see to be a sign that a baby or young child has been shaken?
  - A. Rolling eyes
  - B. Vomiting
  - C. Difficulty breathing and convulsions
  - D. Unconsciousness
  - E. All of the above
  
3. Even though mothers are typically the main caregivers, why are fathers or male partners more likely to shake a baby or young child?
  - A. Men may not be used to a baby's or young child's crying
  - B. Men may be less familiar with a baby's or young child's needs
  - C. Men may have additional stresses, such as financial or family stresses
  - D. Men may use force when frustrated
  - E. All of the above
  
4. Activities that DO NOT cause shaken baby syndrome
  - A. The baby falling off furniture or a counter
  - B. The baby being tossed up and caught
  - C. The baby being bounced on an adult's knee
  - D. The baby jerking in a car seat when a driver stops the car suddenly
  - E. All of the above



5. What are some common reasons that babies cry?
- A. The baby or young child is hungry
  - B. The baby or young child needs to burp
  - C. The baby or young child needs a diaper change
  - D. The baby or young child is tired
  - E. All of the above
6. A sick and crying baby or young child can be very upsetting for any caregiver. Imagine that you have been up all night with a sick baby or young child. You have gotten little or no sleep and you are tired. You are frustrated because no matter what you try, you cannot make the baby or young child stop crying. What are some things a person can do to avoid shaking a baby or young child?
- A. Play music that soothes or distracts you
  - B. Call a friend, neighbor or relative to talk, or to relieve you for a few minutes
  - C. Remind yourself the crying will end
  - D. Call a hotline or 911
  - E. All of the above
7. A baby or young child can become a victim of SBS while in the care of...
- A. Their parents.
  - B. Someone they do not know.
  - C. Someone they do know.
  - D. Any caregiver.
  - E. All of the above
8. Activities that DO NOT cause shaken baby syndrome
- A. A baby falling off furniture or a counter
  - B. A baby being bounced on an adult's knee
  - C. A baby being tossed up in the air and caught
  - D. None of the above
  - E. All of the above
9. Shaken Baby Syndrome is:
- A. Caused by birth defects.
  - B. A form of punishment or neglect.
  - C. Always seen with visible bruises.
  - D. A form of child abuse.
  - E. A disease.

10. Why is a baby so easily hurt?
- A. Because they have strong neck muscles
  - B. Because they are able to tell us what they need
  - C. They have a heavy head – 25% of their body weight
  - D. The brain is still developing
  - E. Both C and D
11. The #1 reason trigger why someone shakes a child is
- A. Loss of appetite
  - B. Sleeping
  - C. Laughing
  - D. Crying
  - E. None of the above
12. Is Shaken Baby Syndrome Preventable?
- A. Sometimes
  - B. Never
  - C. Only with your own children
  - D. Only if you love the child
  - E. Yes, through education
13. Why do babies' cry?
- A. May be colic
  - B. May have minor gas pains
  - C. May have a fever or be sick
  - D. Needs to be held and comforted
  - E. All of the above

## Appendix X

## T-test: Independent Samples Test and Group Statistics

		Group Statistics					
Race		Test	N	Mean	S.D.	t-value	Significance
American Indian, Alaska Native	pre	Experimental	2	7.00	1.41	-3.00	.10
		Control	2	10.00	.00		
	post	Experimental	2	10.00	.00 <sup>a</sup>		
		Control	2	11.00	.00 <sup>a</sup>		
	Post - Pre	Experimental	2	3.00	1.41	2.00	.18
		Control	2	1.00	.00		
Asian	pre	Experimental	13	9.69	2.02	1.31	.21
		Control	6	8.33	2.25		
	post	Experimental	11	11.73	1.01	3.05	.02
		Control	6	8.00	2.90		
	Post - Pre	Experimental	11	2.00	1.79	1.49	.19
		Control	6	-.33	3.61		
Black or African American	pre	Experimental	73	9.37	2.71	-.40	.69
		Control	77	9.53	2.26		
	post	Experimental	74	11.28	2.16	4.11	.00
		Control	72	9.79	2.23		
	Post - Pre	Experimental	71	1.93	2.07	5.27	.00
		Control	67	.28	1.55		
White	pre	Experimental	8	9.75	1.91	-.44	.67
		Control	10	10.20	2.35		
	post	Experimental	6	12.33	1.03	1.23	.26
		Control	6	11.00	2.45		
	Post - Pre	Experimental	5	1.60	1.14	2.23	.05
		Control	6	-.33	1.63		
		a. t cannot be computed because the standard deviations of both groups are 0.					

**Appendix Y**  
**Office of Compliance:**  
**Institutional Review Board Continuing Approval**

OFFICE OF RESEARCH COMPLIANCE

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February 4, 2009

Ms. Margaret Stelzel  
Nursing

Dear Ms. Stelzel:

Your protocol number HR-1569, titled "*Is a school-based educational program effective in changing knowledge regarding prevention of Shaken Baby Syndrome?*" received expedited continuing approval on February 2, 2009, from a member of the Marquette University Institutional Review Board.

Your approval is valid until February 13, 2010. Any changes to your protocol must be requested in writing by submitting an IRB Protocol Amendment Form, which can be found at: <http://www.marquette.edu/researchcompliance/research/irbforms.shtml>. All changes must be reviewed and approved by the IRB before being initiated, except when necessary to eliminate apparent immediate hazards to the human subjects. Any public advertising of this project requires prior IRB approval. If there are any adverse events, please notify the Marquette University IRB immediately.

If you have any questions or concerns, please do not hesitate to contact me. Thank you for your time and cooperation.

Sincerely,



Amanda J. Ahrndt, RN, MS, MSN  
Research Compliance Analyst

cc: Dr. Rebecca Bardwell, IRB Chair  
Dr. Marilyn Frenn, Nursing  
Ms. Erin Fox, Graduate School

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