Fall 2022

Their Health is in Our Hands: A Systematic Review of Sudden Infant Death Syndrome (SIDS) in the United States and Ireland

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Honors Thesis

Submitted

In Partial Fulfillment

of the

Requirements of HON 420

Fall 2022

By

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Abstract

Sudden infant death syndrome (SIDS) has had a significant global impact on infant death rates since before the 1990s. Despite various social campaigns resulting in a significant drop in rates, SIDS is still the leading cause of infant death in the United States. By comparing cultural normalities, risk factors, and incidence internationally, new research can be conducted. Ireland was chosen as the comparative country due to similar socioeconomic statuses, environmental terrains, and heritages. Research was collected first-hand in Ireland through a study abroad experience where key contacts and observations were made. There is no known cause or cure known for SIDS, but recent research questions the impact of infant handling techniques on the risk and prevention of SIDS. These infant handling strategies focus not only how to lay the infant safely to sleep but also how to safely position the baby while they are awake. It is extremely important to assist the infant in developing their musculoskeletal system in order to aid in their development, as pitfalls in development increase the risk of SIDS. However, many of the SIDS safe sleep campaigns have led parents to implement these strategies while the infant is still awake, causing developmental delays. In this way and others, there is an apparent educational gap among parents, caregivers, generations, and even health care providers. The objective of this

systematic review is to compare the infant handling techniques in the United States and Ireland in their effectiveness to reduce the risk or incidence of SIDS.

Key words and phrases: sudden infant death syndrome (SIDS), sudden unexplained infant death (SUID), cot death, infant handling, back to sleep, tummy time, United States, Ireland

Table of Contents

Table of Tables

Table of Figures

Acknowledgements

I would first like to thank my mentor, Dr. Susan Skees-Hermes OTD, OTR/L, for guiding me through my thesis. Your constant support and encouragement kept me motivated and inspired to continue. I greatly enjoyed our time spent together in Ireland, and it had a significant impact on the direction of my research. Next, I would like to thank the Eastern Kentucky University Department of Occupational Science & Occupational Therapy for providing me with the foundational knowledge and resources necessary to conduct this research. The professors within this department have each left a notable impact on my education. The Honors Program has also provided me with not only an enriched education, but also an overwhelmingly supportive pool of professors and peers which have helped me in this project. Specifically, I would like to personally thank Julia Hickey, my peer and friend, for going above and beyond to help me through the research and writing process. Finally, to all of my friends and family, thank you. It is because of your love and care for me that I have the opportunities and courage to accomplish such tasks. I am forever grateful for the impact you each have had in my life and education.

Introduction

Background and Need

Sudden infant death syndrome (SIDS) is the leading cause of death among infants in the United States (Gollenberg & Fendley, 2018). While no cause or cure has been found, various risk factors have been identified. Known risk factors include brain defects, low birth weight, respiratory infections, secondhand smoke, family history of SIDS, male gender, non-white ethnicity, and 4-6 months of age, which is the prime occurrence (Mayo Clinic, 2022). SIDS can also be impacted by maternal factors including being younger than 20 years of age, smoking cigarettes, using drugs or alcohol, or having inadequate prenatal care. Overheating is also known to be a significant risk factor for SIDS (Elabassi et al., 2001). Pacifiers, on the other hand, propose controversy to the prevention or risk to SIDS (Hauck et al., 2005). New research suggests gene variants could contribute to the incidence of SIDS (Kerz et al., 2021).

In 1990, an initial SIDS increase was noted in the United States (Muller-Nordhorn et al., 2020). This was actually noticed in the 1980s in Ireland, and this is believed to be due to turmoil within the country at the time which also sparked a recession (De Visme et al., 2020; Douglas, Helms, & Jolliffe, 1998; Freyne et al., 2014). In 1994, the United States introduced the Back to Sleep campaign, which encouraged parents to place their infants on their backs to sleep, in the supine position, to prevent suffocation (Gollenberg & Fendley, 2018). An infant should not be placed on their stomach to sleep until they are able to roll from their stomachs to their backs independently, which occurs around 6 months of age in the typically developing infant (Bullock et al., 2004; Williams, 2018). While the Back to Sleep Campaign originated in America, it quickly spread through public health messaging to other industrialized countries, Ireland included.

In 1996, there was a decrease in SIDS incidence noted in both countries (Muller-Nordhorn et al., 2020). However, there was also a decrease in motor skill development and an increase in plagiocephaly, which involves flattening of the backs of infants' heads (Williams, 2018; Zachary & Kitzman, 2011). Babies are born with unfused bones in their skulls to allow for easier exit through the birth canal, which causes soft spots on their heads until these plates fuse. If an infant regularly sleeps in one position too often, the skull can be permanently flattened in one area. This was the first indicator of a problem still major to America: parents took the Back to Sleep campaign beyond just sleep and began to leave their infants in the supine position much longer than what was recommended (Vladescu et al., 2020).

These events sparked the 1998 Tummy Time campaign by the American Academy of Pediatrics (AAP) (Moyer, 2020). This encouraged parents and caregivers to allow their infants to utilize the prone position while supervised for developmental purposes (Moyer, 2020). It is extremely important for infants to have the freedom of movement to push through their arms to hold themselves up and hold up their heads to begin to crawl and develop their gross and fine motor skills as well as hand-eye-coordination (KidsHealth, 2019).

SIDS is still relevant today. While the rates did decrease by the Back to Sleep and Tummy Time campaigns, there has since been a plateau (Muller & Nordhorn et al., 2020). While there are many identified factors which could contribute to this plateau, this thesis delves into the various infant handling techniques which contribute to the risk of SIDS. By identifying the trends in SIDS rates and handling practices, parents can be properly informed on the most effective prevention handling strategies and decrease SIDS incidence in the United States.

The relevance of SIDS is evident in every healthcare practice as most everyone has cared or will care for an infant at one point in their lives. Education on proper infant handling needs to

be provided proportionally across the nation. This begins with the education of healthcare workers including but not limited to nurses, occupational therapists, OB/GYNs, and midwives. It is most important for proper infant handling strategies to be demonstrated by healthcare workers, especially while under the supervision of the parent or caregiver so that proper handling procedures will be carried into the home environment as well (Bullock et al., 2004).

Problem Statement

The problem this research seeks to address is how various infant handling techniques affect the risk of SIDS incidence in the United States and Ireland.

Statement of Purpose

The purpose of this systematic review is to analyze the various infant handling studies in the United States and Ireland in their effectiveness of reducing SIDs incidence.

Research Question

How do infant handling techniques in the United States compare to those of Ireland in relation to the risk of SIDS/SUID/cot death?

Thesis Statement

As the plateau in the incidence of sudden infant death syndrome (SIDS) continues, the need for proper education on infant handling procedures becomes increasingly essential. By identifying the safest and most effective infant handling techniques in reducing SIDS from the United States and Ireland and educating parents and caregivers on them, the incidence of SIDS can be reduced.

Literature Review

Terminology

For the purpose of examining all relevant research for this thesis, both the terms “SIDS” and “SUID” (sudden unexplained infant death) were included in search terms. Cot death is a term typically used interchangeably with SIDs in Ireland, so it was included in this thesis.
In this study, sudden infant death syndrome was defined by the Mayo Clinic (2022) as the unexplained death, usually during sleep, of a seemingly healthy baby less than a year old. Sudden unexpected infant death and sudden unexplained infant death are used interchangeably in this study. Sudden unexpected infant death is defined by the Centers for Disease Control and Prevention (CDC) as “the sudden and unexpected death of a baby less than 1 year old in which the cause was not obvious before investigation. These deaths happen during sleep or in the baby’s sleep area (2022).

The term sudden unexplained death in childhood is defined by the National Organization for Rare Disorders (NORD) as “the sudden death of a child 12 months of age or older that remains unexplained after a thorough case investigation, including performance of a complete autopsy, examination of the death scene, and review of the clinical history” (2021). This term was not included in the search due to the age being over 12 months. All data in this study focus on infants less than 12 months of age.

In this study, prone is defined by Merriam-Webster as “having the front or ventral surface of a body facing downward; lying with the chest and stomach positioned downward” (2022). There is a differentiation between prone positioning during sleep and while the infant is awake. Supine positioning is defined by Merriam-Webster as “lying on the back or with the face

upward" (2022). The side-lying position is a combination of lateral, meaning "to the side," and recumbent, meaning "lying down" (Bailey, 2019).

The terms pacifier and soother are used interchangeably, as pacifier is the term typically used in America, and soother is the term typically used in Ireland. A pacifier is defined by Merriam-Webster as "a usually nipple-shaped device for babies to suck on" (2022). Soother is defined by Your Dictionary as a Canadian and Irish term which is "a plastic device that goes into a baby's mouth, used to calm and quiet the baby" (n.d.).

The terms crib and cot are also used interchangeably, as crib is the term typically used in America, and cot is the term typically used in Ireland. A crib is defined by Merriam-Webster as "an enclosure especially of framework; such as a small child's bedstead with high enclosing usually slatted sides" (2022). A cot is defined by Cambridge Dictionary as "as a small bed for a baby or young child with high bars around the sides so that the child cannot fall out" (2022).

Republic of Ireland

The two countries discussed in this research are the United States and the Republic of Ireland. The Republic of Ireland was chosen as the country of comparison to the United States due to a recent study abroad experience to the country due to the common English language which allowed for opportunities for connections and an understanding of the culture and literature which propelled this project. The Republic of Ireland is specified separately from the region of Ireland known as Northern Ireland. Therefore, when referring to plainly "Ireland" in this study, the region specifically in question is the Republic of Ireland.

There are a multitude of similarities between the United States and Ireland. They are both industrialized countries with similarly implemented social campaigns, socioeconomic statuses,

heritage and lineages, and environmental terrains (International Citizens Insurance, 2022; Shi & Singh, 2022).

Comparison of Health Care Systems

While America incorporates a quasi-market system, utilizing both private and public health care, Ireland has a universal health care model (Improving Healthcare Decisions, 2022; International Citizens Insurance, 2022; Shi & Singth, 2022). The United States provides government coverage through Medicare and Medicaid, but this is still not offered to everyone resulting in a high volume of uninsured populations (Improving Healthcare Decisions, 2022; Shi & Singh, 2022). Most American citizens receive health care through private health insurance plans, through their place of employment, or pay out of pocket costs. The reason for this crucial difference between the two systems is politically and economically driven. The Irish public health care system is funded through taxation dollars and government regulation of health care while the American quasi-market system is funded directly by payments from recipients of the care, public and private insurance, charities, and tax dollars (Improving Healthcare Decisions, 2022; International Citizens Insurance, 2022).

In Ireland, a person's socioeconomic status dictates the category of care they will receive; for example, Category 1 care covers all medical expenses through a medical card system (International Citizens Insurance, 2022). A general practitioner (GP) card can be utilized by those who are just above the threshold for a medical card in Ireland. The Irish population who do not receive a medical or GP card are still eligible for the universal health care system as Category 2 care, which charges about 50 euros for a doctor's visit and 100 euros for an emergency visit without a doctor's referral.

Because of the socialized health care model, every Irish citizen receives health care, including newborns (International Citizens Insurance, 2022). However, the negative consequence of a socialized health care model such as Ireland's involves longer waits. Furthermore, the system can become expensive for those who do not qualify for the medical or GP card systems. This leads many Irish citizens to purchase private insurance, which allows for decreased waits and provides higher technology diagnostic procedures.

Typical Infant Development

This description of the general stages of infant development is provided by the Center of Disease Control (CDC). The 2-6 month range is the most relevant to the purpose of this research on safe handling techniques (CDC, 2022). At 2 months, the typical infant can start to hold up their head while on their stomach. At 4 months, they can support their own head and push up onto their elbows and forearms when on their stomach. At 6 months, an infant can roll from their stomach to their back. Identifying when the infant is able to roll over is extremely important in determining the safe sleep protocols. Between 7 and 9 months, an infant can roll over in both directions, even in their sleep (Mayo Clinic, 2022). They also further develop their hand-eye coordination so they are able to use fine motor skills to pull objects closer to them and move them away. At 9 months, the typical infant can get into the sitting position and sit up by oneself (CDC, 2022). Finally, at 1 year old, a typically developing infant can push up to stand and start to walk.

These developmental milestones are recorded for the typically developing infant. These major checkpoints determine how infants should be handled. Whether they occur earlier or later than the typical development is less important to the purpose of this research; it is instead more

significant to understand at what point in an infant's development it is safe to implement various handling strategies.

AAP Safe Sleep Recommendations

The American Academy of Pediatrics (AAP) provides recommendations for hospitals and caregivers concerning the various aspects of health and safety for children. The AAP provides recommendations for safe infant sleep in order to reduce the incidence of SIDS.

These recommendations include:

> Place infants on their backs for sleep in their own sleep space with no other people. Use a crib, bassinet, or portable play yard with a firm, flat mattress and a fitted sheet. Avoid sleeping on a couch or armchair or in a sitting device, like a swing or car safety seat (except while riding in the car). Keep loose blankets, pillows, stuffed toys, bumpers, and other soft items out of the sleep space. Breastfeed if possible, and avoid smoking (American Academy of Pediatrics, 2022).

A main focus of these recommendations is to avoid accidental suffocation. The implementation of supine sleep, which involves sleeping on one's back, is the safest sleeping position (Zachary & Kitzmann, 2011). Prone positioning involves placing the infant's face downward against the bedding. If an infant's breathing becomes occluded while in the supine position, they will not have the appropriate upper body muscles developed to push themselves back into a position where they can once again properly breathe. This could happen by an infant turning their head and becoming completely submerged in the bedding or by an article of bedding material blocking the infant's airway.

In order to reduce the chances of bedding materials obstructing infants' breathing, the AAP recommends excluding loose materials such as these from the sleep area and rather utilize a

firm, flat mattress with a fitted sheet (American Academy of Pediatrics, 2022). The incidence of loose bedding materials also coincides with co-sleeping, pacifier usage, and overheating. While bed sharing has been said to promote breastfeeding, which is a protective factor for SIDs, co-sleeping with an adult increases the risk of suffocation (Zachary & Kitzmann, 2011).

Co-sleeping is defined by Zachary & Kitzmann (2011) as any shared sleeping arrangement of an infant with any parent(s)/relative in or on a bed/sofa/armchair. Co-sleeping infants are at a greater risk for SIDS due to the greater likelihood of suffocation and entrapment. The practice commonly occurs among those with a lower socioeconomic status, and the risks are significantly magnified if the infant's mother smoked during pregnancy (McGarvey et al., 2003). It is recommended that co-sleeping should especially be avoided until at least 20 weeks, or when the infant is less vulnerable to suffocation and able to roll over (Zachary & Kitzmann, 2011; McGarvey et al., 2003). It is much easier for an infant to turn to prone positioning, making them 11 times more likely to die from SIDS, while co-sleeping (McGarvey et al., 2003).

Furthermore, co-sleeping infants who routinely used a soother were significantly more likely than non co-sleeping infants to be missing their soother during the reference sleep period (Zachary & Kitzmann, 2011). This indicates that the infant who lost their soother may look for it in the blankets and pillows, increasing their chance of suffocation. However, the discussion on pacifier usage on the risk of SIDS is controversial as there has been recent research supporting the notion of pacifiers as a protective factor against SIDS (Hauck et al., 2005). One theory postulates that pacifier usage enhances the infant's ability to breathe through their mouth if their nasal airway becomes obstructed. Another theory proposes that because the retroposition of the tongue can lead to obstructive apnea and asphyxiation, sucking on a pacifier will decrease the risk of oropharyngeal obstruction by requiring a forward position of the tongue.

Bedding covers also risk the incidence of overheating, which can also occur by over bundling the infant in clothing (Zachary & Kitzmann, 2011). Signs of profuse sweating are present in 35.7% of SIDS cases (Elabassi et al., 2001). Heat stress is extremely dangerous for infants as they are not able to dissipate excess body heat. The supine position allows for a greater loss of heat than the prone position, further supporting the supine sleep position in the prevention of SIDS.

The AAP began recommending infants not sleep in infant carriers such as car seats, unless in a moving car, until 2016 (Patton et al., 2015). There is a significant negative correlation between the total amount of time spent in equipment such as seating devices, walkers, or playpens and motor development score (Myers et al., 2006). This is due to the passive devices restricting infants from developing the muscles and skills necessary to reach various milestones. In fact, 42% of typically developing infants spend between 4-8 hours/day in a seating device; this will not only encourage the manifestation of plagiocephaly, but also prevent the development of various motor skills. For example, if an infant at 5 months who can sit unsupported is restricted to swing or seat carrier for long periods of time, they become accustomed to the passive position and do not actively work their muscles, balance, and coordination. The more an infant develops, the more protected they are from the risk of SIDS. Therefore, while keeping an infant in a car seat carrier may seem to temporarily protect them, it will cause further harm in the long term.

Back to Sleep Campaign, 1994

The initial rise in SIDS peaked around 1990 in the United States. According to Shi & Singh (2020), the 1980-2010 period is known as the Corporate Era in the US. During this period, an increase in Managed Care Organizations (MCOs) as well as private insurances occurred (Shi & Singh, 2022). The development of managed care led to three key developments of the health

care market between 1999-2001: tight labor markets which created less restrictive access to care, innovative health plans as they moved away from the core strategies in the "managed care toolbox," and improvements in services and amenities as providers competed for patients (Lesser et al., 2003).

The context surrounding this time period is critical to understanding the development and significance of the Back to Sleep campaign, which originated just a few years prior in 1994 (Muller-Nordhorn et al., 2020). As health care organizations became more organized, competitive, and professional, the Back to Sleep campaign was propelled into the public eye (Gollenberg & Fendley, 2018). However, at this time, the main source of media access was through public service messages in the shapes of billboards and television. As daycares were state licensed, they, along with hospitals and doctors' offices, were another main avenue for safe sleep information. While this was the ideal mode of information transfer for some individuals, many low-income families and individuals still did not receive adequate knowledge from health care professionals on safe sleep practices.

The Back to Sleep campaign was introduced in 1994 by the National Institute of Child Health Development (NICHD) in partnership with the American Academy of Pediatrics, the Maternal and Child Health Bureau of the Health Resources and Services Administration, the SIDS Alliance (now First Cradle), and the Association of SIDS and Infant Mortality Programs (National Institute of Child and Human Development, 2022). While the back to sleep campaign originated in the United States, it soon after spread to other industrialized countries such as Ireland. This campaign demonstrated the connection between prone positioning, sleeping on one's stomach, and SIDS, therefore recommended caregivers place infants in the supine position, or laying on one's back to sleep (Moyer, 2020). Researchers believe the danger of infant prone

sleeping is due to rebreathing of carbon dioxide when an infant's face is suffocated as well as excessive thermal insulation (Gollenberg & Fendley, 2018).

The side-lying position is a common position utilized especially in hospitals (Bullock et al., 2004). However, this position is not safe and is not recommended by the AAP; infants in the side-lying position are easily able to roll from their sides to the prone position where they are likely to suffocate.

While the risks of prone sleep have been well established, many parents, caregivers, and healthcare providers still place their infants on their sides or stomachs to sleep. Because nurses are working directly with the parents and infant for the first 24-48 hours after birth, they are in a position to greatly influence what the parents will implement in the home environment. However, in a study by Bullock et al. (2004), 97% of nurses were aware of AAP sleep recommendations, and only 67% agreed with the regulations; 55% of the infants were found in the side-lying position. In another more recent study by Frey et al. (2020), all providers had the appropriate knowledge of safe sleep practices as over 80% were up-to-date on the specific recommendations regarding sleep placement, co-sleeping, and swaddling, but baseline audits indicated that none of the patients met all safe sleep practices in the hospital.

One possibility proposed for this noncompliance is the fear of aspiration or choking while in the supine position. However, there is no evidence of this phenomenon due to the supine sleep position (Bullock et al., 2004; Rainey & Lawless, 1994). There is evidence of the nurses' perceptions influencing parents' actions as in a study by Rainey & Lawless (1994), 53% of mothers were worried their infant would choke in the supine position. This demonstrates a need for a new educational campaign focusing directly on the health care providers working with infants and families immediately after birth.

Tummy Time Campaign, 1998

Because of the risks of prone positioning brought about by the back to sleep campaign, parents and caregivers completely substituted prone positioning for supine positioning. This led to infant plagiocephaly, soft spots on the infant's skull, which could lead to permanent damage (Williams, 2018). Infants were also unable to develop their core and neck muscles needed to hold up their heads, crawl, roll over, and play. This is extremely significant in the case of SIDS, as infants were unable to roll over in their cribs if they were suffocating.

As the dangers of prolonged supine positioning came into light, health care providers introduced tummy time in 1998 (Moyer, 2020). Tummy time pushed caregivers to start placing their infants in supervised prone positioning each day, starting at 3-5 minutes and working their way up to 1 hour per day by 3 months of age (KidsHealth, 2019). However, infants only begin to control their head and neck muscles around 3 months of age, and do not gain full control until 6 months (Bradley, 2021). This indicates that infants younger than 6 months may not be able to tolerate even 3 minutes of tummy time at once, and smaller increments may have to be implemented in the infant's early months. Vladescu (2020) recommends incorporating supervised prone play for 60 minutes per day in order to promote upper body development and minimize skull deformity. This decreased the risk of infants developing plagiocephaly, strengthened their neck and core muscles, and allowed them to develop their fine and gross motor skills.

As new technologies developed, passive infant seating and handling devices emerged in the decade 2000-2010. The most prominent devices in infants younger than 5 months of age are bouncy seats, swings, car seats, stationary activity centers, and baby rockers, respectively (Meyers et al., 2006). These devices typically require less trunk support and encourage more

opportunities for supported standing. However, like with infants younger than 5 months of age, overuse of these devices can limit further development.

The development of infant seating devices spurred a cultural norm within the United States for passive handling. To actively handle an infant is to manipulate them in such a way that various muscles are engaged. For example, holding an infant upright over one's shoulder so their head is upright and neck muscles are engaged is a prime example of early active handling. Furthermore, prone play, also known as tummy time, in which an infant is placed on the ground on their stomach where they are forced to hold themselves up on their arms, engages their upper body and is a prime example of an active position. To passively handle an infant is to manipulate them in such a way that their muscles are relaxed. Passive handling can be exemplified in cradling an infant in one's arms so they are relaxed and their muscles are disengaged.

In a study by Libertus & Needham (2010), active-training infants were able to contact and move objects themselves while passive-training infants observed the objects being moved and touched to their hands by their parents. Applying conclusions from this study, infants who are handled actively will be more assertive in their play and therefore enhance their development; infants who are handled passively will be more stationary and observative in their play and therefore impede their development.

Williams (2018) discusses a plagiocephaly screening pathway (PSP), which emphasizes early exposure to prevention strategies and screenings through community child health services. If detected, Williams (2018) recommends referring the infant to the ABC prevention strategy to prevent the infant from further injury. The ABC mnemonic emphasizes active, balanced handling with corrective strategies.

Current Trends

The three charts depicted below display the current trends of SIDS, SUID, and infant mortality incidence in the United States and Ireland. Because of the various changes in literature through the years examined in this thesis and the limited literature available on the topic, rates of both SIDS, SUID, infant mortality, and cot death are included in the statistical analysis. Each chart also provides evidence to prove the effectiveness of the 1994 back to sleep campaign.

Figure 1 notes the rates of SUID (sudden unexplained infant death) in Ireland and the United States from 1970-2010 (Muller-Nordhorn et al., 2020). The peak of SUID in Ireland is noted to be higher than the peak of SUID in the United States. The rates of SUID in Ireland are then shown to decrease much more quickly and steadily than those of the United States. Though both were evidently positively impacted by the Back to Sleep campaigns as rates plummeted between 1990-2000, the rates of SUID in Ireland continued to decrease after 2010 while those of Ireland stayed at a plateau. This indicates the Back to Sleep campaign was possibly either more effective in Ireland, or there were other factors causing the continued decrease in rates in Ireland. These factors will be further examined from an occupational therapy lens, focusing primarily on the infant handling strategies and social campaigns while still acknowledging the evidence supporting other reasons for these differing rates such as genetics.

Figure 2 displays infant mortality rates in Ireland from 1970-2020 (Macrotrends LLC, 2022). These rates, peaking in the 1970s, also depict a sharp decrease in rates from 1990-2000, indicating the effectiveness of the Back to Sleep campaign on general infant mortality in Ireland. The rates show a continuous decrease, indicating that Irish rates of infant mortality are still steadily decreasing.

Figure 3 pictures infant mortality rates by cause in the United States from 1990-2018 (Centers for Disease Control and Prevention, 2022). The categories included in this search

consist of SIDS, SUID, accidental suffocation and strangulation in bed, and unknown causes. A sharp decrease is again noted from 1990-2000, indicating effectiveness of the Back to Sleep campaign. However, as the rates of SIDS and SUID continue to decrease, the rates of accidental suffocation and strangulation in bed and unknown causes steadily increase, implying possible ambiguity of literature terms. This implies that the rates of infant mortality in the United States may not be truly decreasing, but rather are being re-classified.

Figure 1.

Sudden Unexplained Infant Death Rates in the United States and Ireland from 1970 to 2010.

(Muller-Nordhorn et al., 2020)

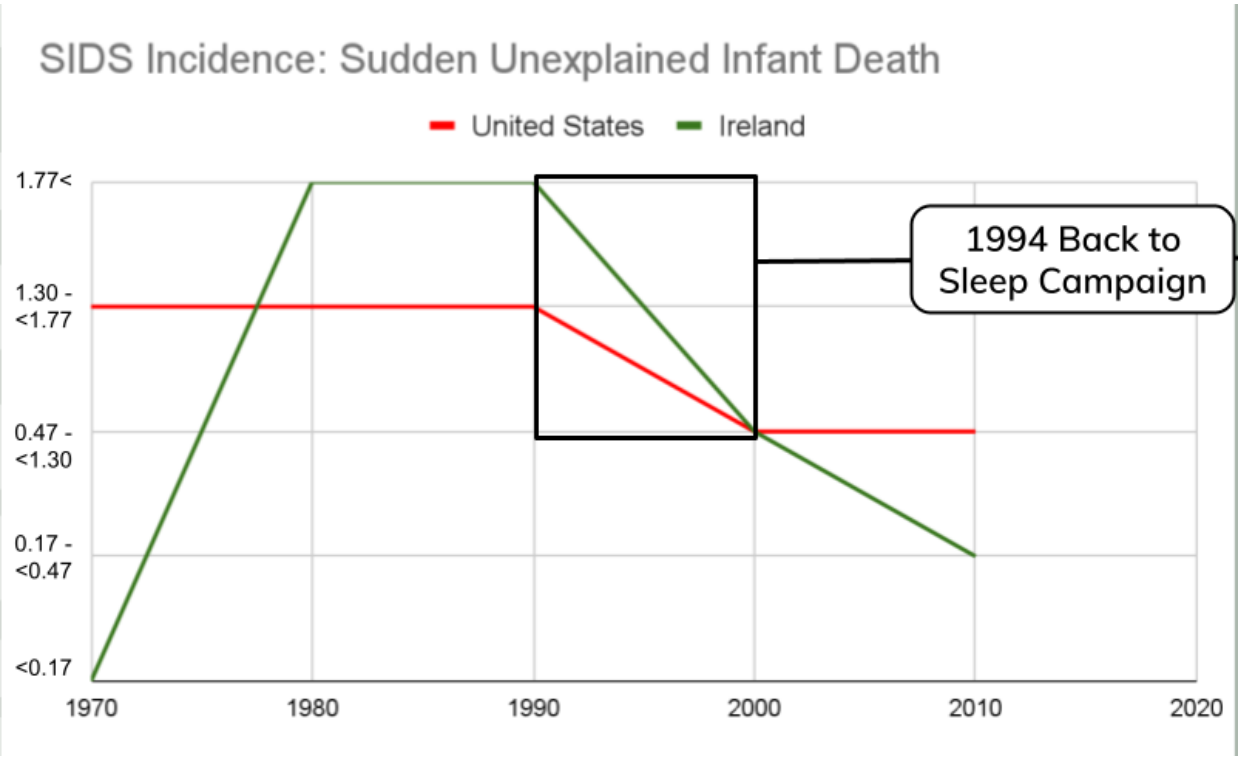


Figure 2.

Infant Mortality Rates in Ireland from 1970 to 2010.

(Macrotrends LLC, 2022)

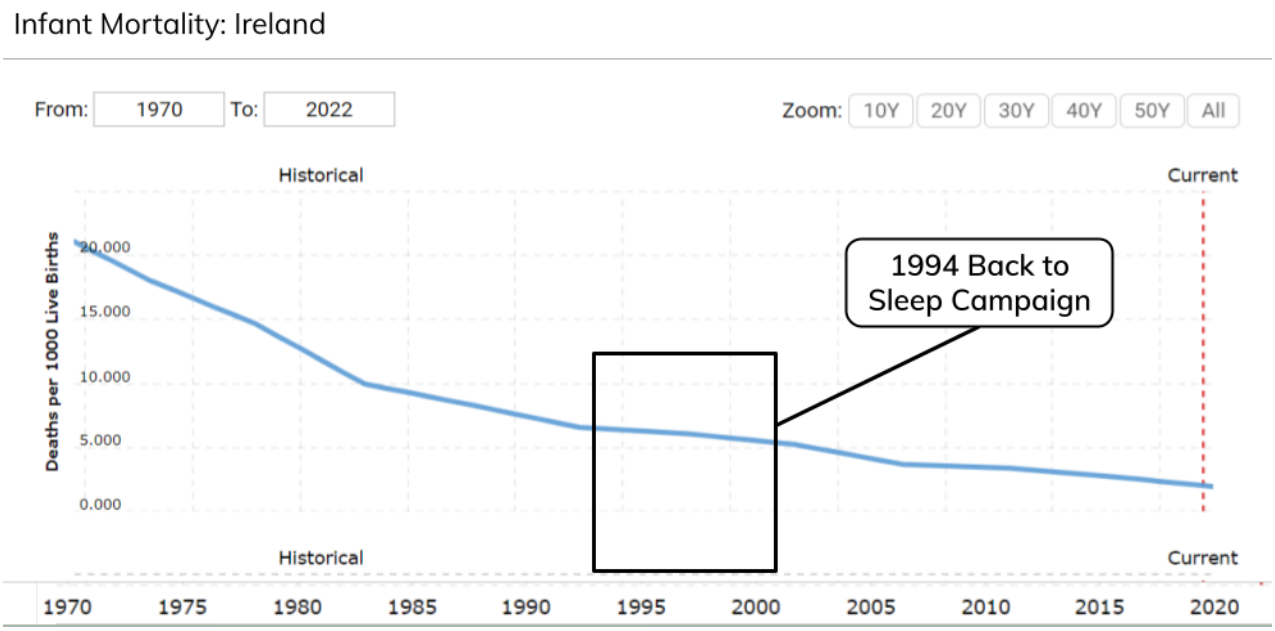
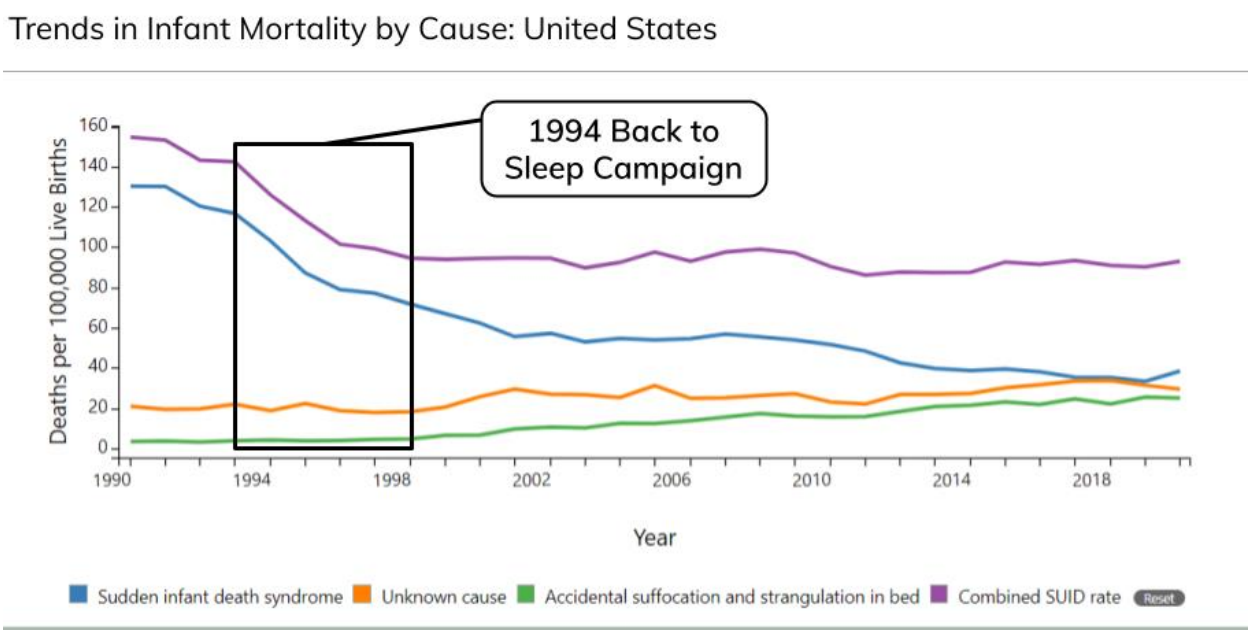


Figure 3.

Infant Mortality Rates by Cause in the United States from 1990 to 2018. Includes Sudden Infant Death Syndrome (SIDS), Combined Sudden Unexplained Infant Death (SUID), Accidental Suffocation and Strangulation in Bed, and Unknown Causes.

(Centers for Disease Control and Prevention, 2022)



Assumptions

There were several assumptions made while completing this systematic review. The researcher is an occupational science student and aims to become an occupational therapist. Because of this, the researcher has a prior understanding and belief in the effectiveness of infant handling strategies. In the specific case of this systematic review, the researcher believes that proper active handling interventions will prove effective in reducing the incidence of sudden infant death syndrome in the United States and Ireland. The researcher assumes that the results from the analysis of the articles included in the review will accurately show the benefits of active handling techniques for infants in reducing the incidence of SIDS.

Methods

A systematic review was conducted to investigate the research question. A systematic review aims to "search, appraise and collect all relevant empirical evidence in order to provide a complete interpretation of search results" (Pericic & Tanveer, 2019). Systematic reviews are often utilized in studies concerning health care as they can filter through all of the relevant literature on the topic to formulate the most accurate known conclusion (Pericic & Tanveer, 2019). The effectiveness of infant handling strategies in relation to the prevention of SIDS in the United States and Irealnd is under investigation in this study.

In this systematic review, 4 databases were utilized in an electronic search strategy to gather the most evidence on the topic of SIDS. The Irish Journal of Occupational Therapy and the American Journal of Occupational Therapy were utilized to gather information on SIDS specific to handling and positioning, as this is a realm of occupational therapy. CINAHL Complete was used to broaden the search for outliers. EBSCOhost MEDLINE was utilized to find more medically-based research.

The electronic searches for the United States (Table 1) and Ireland (Table 2) were conducted separately. Table 1 depicts the search terms and articles for the United States. The Irish Journal of Occupational Therapy was not utilized in the electronic search for the United States as it was reasonably assumed there would not be adequate results. There were five (T1-T5) search terms utilized for the United States electronic search: “cot death OR SIDS OR sudden infant death syndrome OR suid OR sudden unexplained infant death,” “USA OR United States,” “handling OR positioning,” “prone OR prone to play OR tummy time,” and “supine OR back to sleep OR safe sleep.” Sudden infant death syndrome was expanded to also include sudden unexplained infant death (SUID) due to the recent shift in the terminology in literature. As these results were too broad, the researcher chose to continue narrowing the search.

There were five (T1-T5) search terms utilized for the Ireland electronic search: “cot death OR SIDS OR sudden infant death syndrome OR suid OR sudden unexplained infant death,” “Ireland OR Republic of Ireland,” “handling OR positioning,” “prone OR prone to play OR tummy time,” and “supine OR back to sleep OR safe sleep.” The term “cot death” is utilized as it is a common term used in Irish literature in place of SIDS or sudden infant death syndrome. This term was also included in the United States terms for consistency. The term “Republic of Ireland” was specified as this study focuses on this region of Ireland rather than Northern Ireland. The American Journal of Occupational Therapy was not utilized in the search for Irish data as it was reasonably assumed that it would not yield significant results. The results of this search were also too broad, so the researcher continued to narrow the search.

By combining various key words and search terms, the results were narrowed. There were three final combinations of key words used in each database. While searching the American Journal of Occupational Therapy, the T2 term “USA OR United States OR America" was not

included as it would cause redundancy. Similarly, while searching the Irish Journal of Occupational Therapy, the T2 term “Ireland OR Republic of Ireland” was not included as it would cause redundancy.

For the United States, the first combination of key words (T1 and T2 and T3) produced 120 results from the American Journal of Occupational Therapy, 23 results from CINAHL Complete, and 98 results from MEDLINE (EBSCOhost Web). The second United States combination of key words (T1 and T2 and T4) produced 34 results for the American Journal of Occupational Therapy, 60 results for CINAHL Complete, and 272 results for MEDLINE (EBSCOhost Web). The third United States combination of key words (T1 + T2 + T5) produced 19 results for the American Journal of Occupational Therapy, 122 results for CINAHL Complete, and 368 results for MEDLINE (EBSCOhost Web).

For Ireland, the first combination of key words (T1 and T2 and T3) produced 76 results for the Irish Journal of Occupational Therapy, 0 results for CINAHL Complete, and 0 results for MEDLINE (EBSCOhost Web). The second Ireland combination of key words (T1 and T2 and T4) produced 38 results for the Irish Journal of Occupational Therapy, 4 results for CINAHL Complete, and 12 results for MEDLINE (EBSCOhost Web). The third Ireland combination of key words (T1 and T2 and T5) produced 26 results for the Irish Journal of Occupational Therapy, 3 results for CINAHL Complete, and 6 results for MEDLINE (EBSCOhost Web).

The identified articles were then narrowed based on title, as shown in Figures 4, 5, 6, and 7. For the United States, this resulted in a total of 17 articles from the American Journal of Occupational Therapy, 180 articles from CINAHL Complete, and 364 articles from MEDLINE (EBSCOhost Web). For Ireland, this resulted in a total of 0 articles from the Irish Journal of

Occupational Therapy, 6 articles from CINAHL Complete, and 16 articles from MEDLINE (EBSCOhost Web).

The articles were further narrowed by the abstract and date, as shown in Figures 4, 5, 6 and 7. Duplicates from each database were also removed. For the United States, this resulted in 2 articles from the American Journal of Occupational Therapy, 18 articles from CINAHL Complete, and 28 articles from MEDLINE (EBSCOhost). This amounted to a total of 48 eligible United States articles. For Ireland, this resulted in 0 articles from the Irish Journal of Occupational Therapy, 0 articles from CINAHL Complete, and 1 article from MEDLINE (EBSCOhost). This amounted to a total of 1 eligible Ireland article.

After the eligible and relevant articles were extracted, the 6 most relevant were chosen as the final results from the systematic review. 6 of these were from the United States, and 1 was from Ireland. The results for the United States are shown in Table 3, and the results for Ireland are shown in Table 4.

Inclusion Criteria

The inclusion criteria for this literature search included five requirements. Articles had to be published within the past 10 years at the time of research, meaning only articles published in 2012 onward were eligible. Other articles and resources outside of this range were eligible as citations for the literature review to gain retrospective knowledge of the history of SIDS. The articles had to include the terms “sudden infant death syndrome (SIDS),” “sudden unexplained infant death (SUID),” or “cot death” in the text. Because of the ever-changing terminology, SUID was included as a relevant search term. The term “cot death” is common in Irish literature, but it was also used in the United States search terms to ensure reliability. All articles in the systematic review had to be peer-reviewed and published in an academic journal in order to

ensure validity. References outside of the systematic review could be any other academically reliable source. Infants in all studies had to be less than 1 year of age as the SIDS criteria only extends to 1 year. All articles had to be about the United States or Ireland. Other citations outside of the systematic review could include any English-speaking country for comparison.

Table 1.

Comprehensive Search of Literature Using an Electronic Search Strategy: United States

Search Term	American Journal of Occupational Therapy	CINAHL Complete	MEDLINE (EBSCOhost Web)
T1: Cot Death or SIDS or Sudden Infant Death Syndrome or SUID or Sudden Unexplained Infant Death	2809	4,154	50,427
T2: USA or United States or America	7520	644,859	6,485,343
T3: handling or positioning	5680	51,385	207,530
T4: Prone or Prone to Play or Tummy Time	7744	17,446	93,271
T5: Supine or Back to Sleep or Safe Sleep	4619	9,605	33,731
T1 + T2	64	425	3,803
T1 + T2 + T3	120 (-T2)	23	98
T1 + T2 + T4	34 (-T2)	60	272
T1 + T2 + T5	19 (-T2)	122	368

Table 2.

Comprehensive Search of Literature Using an Electronic Search Strategy: Republic of Ireland

Search Term	Irish Journal of Occupational Therapy	CINAHL Complete	MEDLINE (EBSCOhost Web)
T1: Cot Death OR SIDS OR Sudden Infant Death Syndrome OR SUID OR Sudden Unexplained Infant Death	728	4,154	50,427
T2: Ireland OR Republic of Ireland	>31,000	28,213	153,971
T3: handling OR positioning	>264,000	51,385	207,530
T4: Prone OR Prone to Play OR Tummy Time	>25,000	17,446	93,271
T5: Supine OR Back to Sleep OR Safe Sleep	>8,000	9,605	33,731
T1 + T2	99	10	141
T1 + T2 + T3	76 (-T2)	0	0
T1 + T2 + T4	38 (-T2)	4	12
T1 + T2 + T5	26 (-T2)	3	6

Figure 4.

Chart demonstrating the method of gathering articles for the combination T1 and T2 and T3: United States.

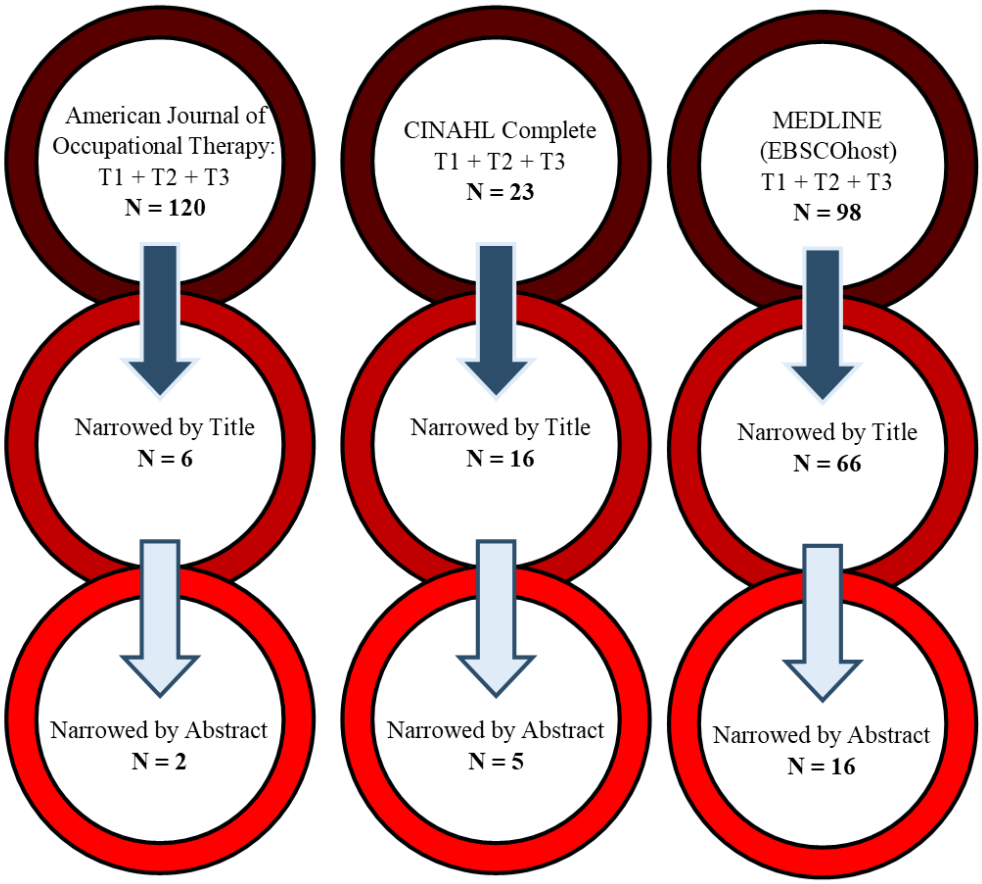


Figure 5.

Chart demonstrating the method of gathering articles for the combination T1 and T2 and T4: United States.

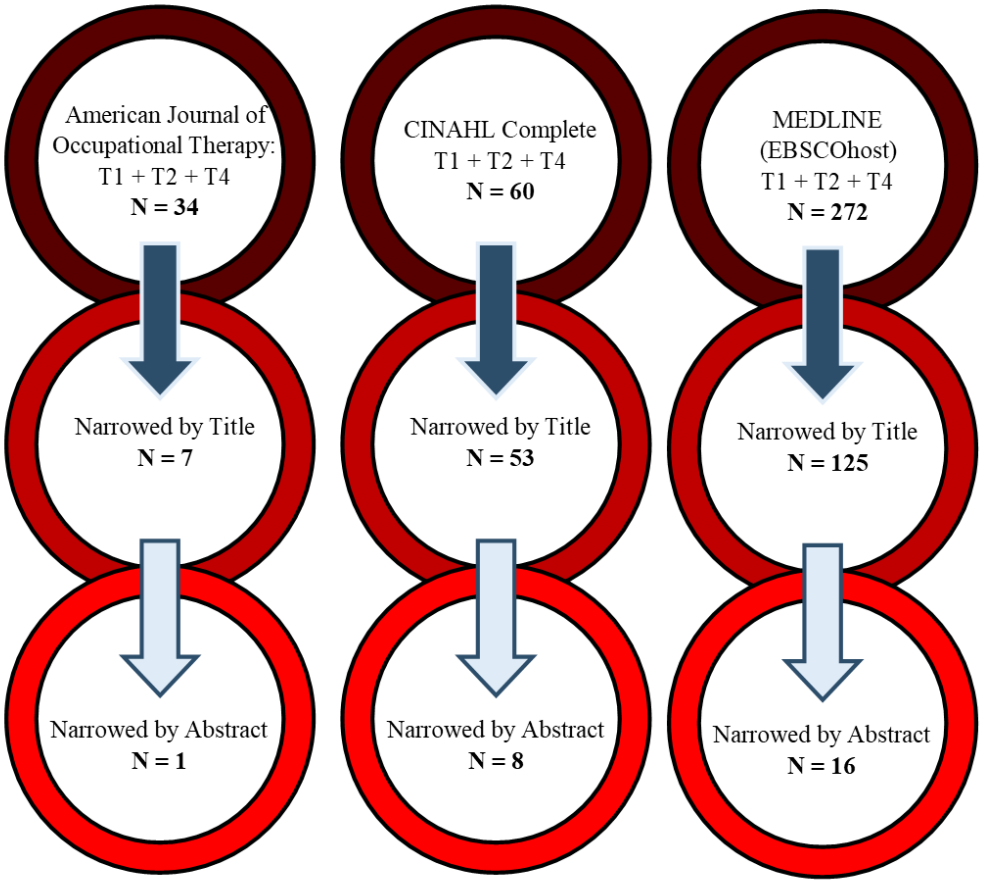


Figure 6.

Chart demonstrating the method of gathering articles for the combination T1 and T2 and T5: United States.

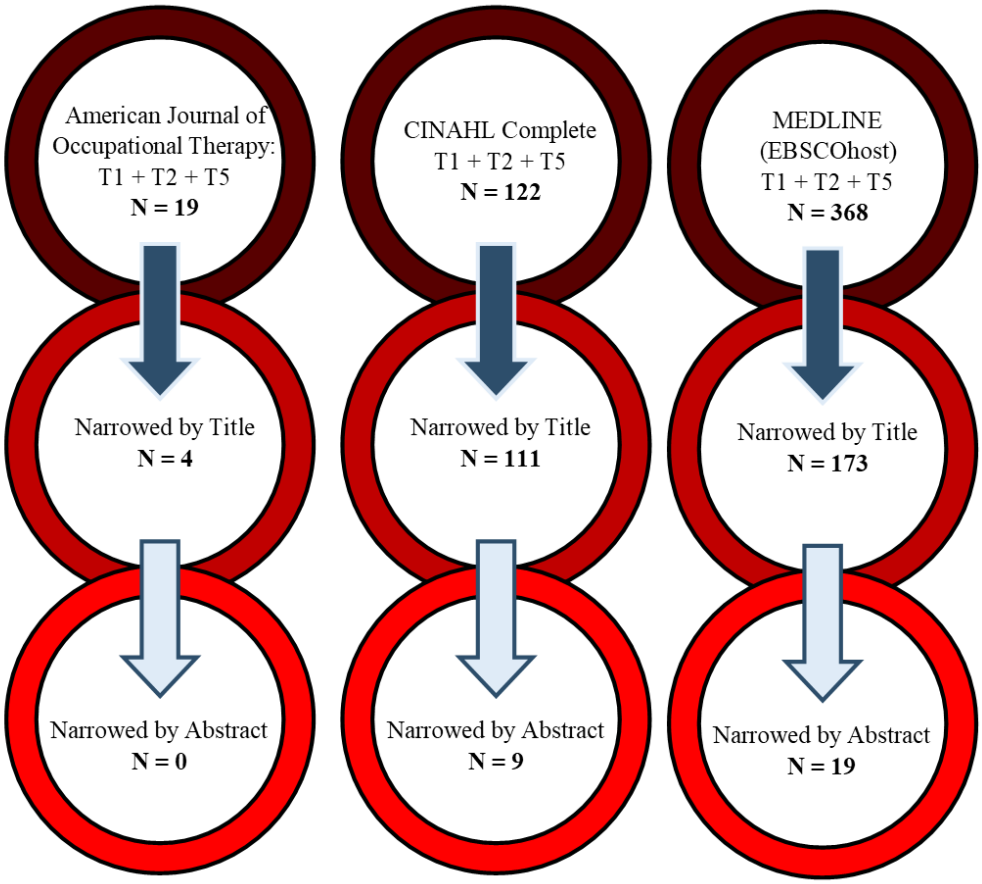


Figure 7.

Chart demonstrating the method of gathering articles for the combination T1 and T2 and T3: Republic of Ireland.

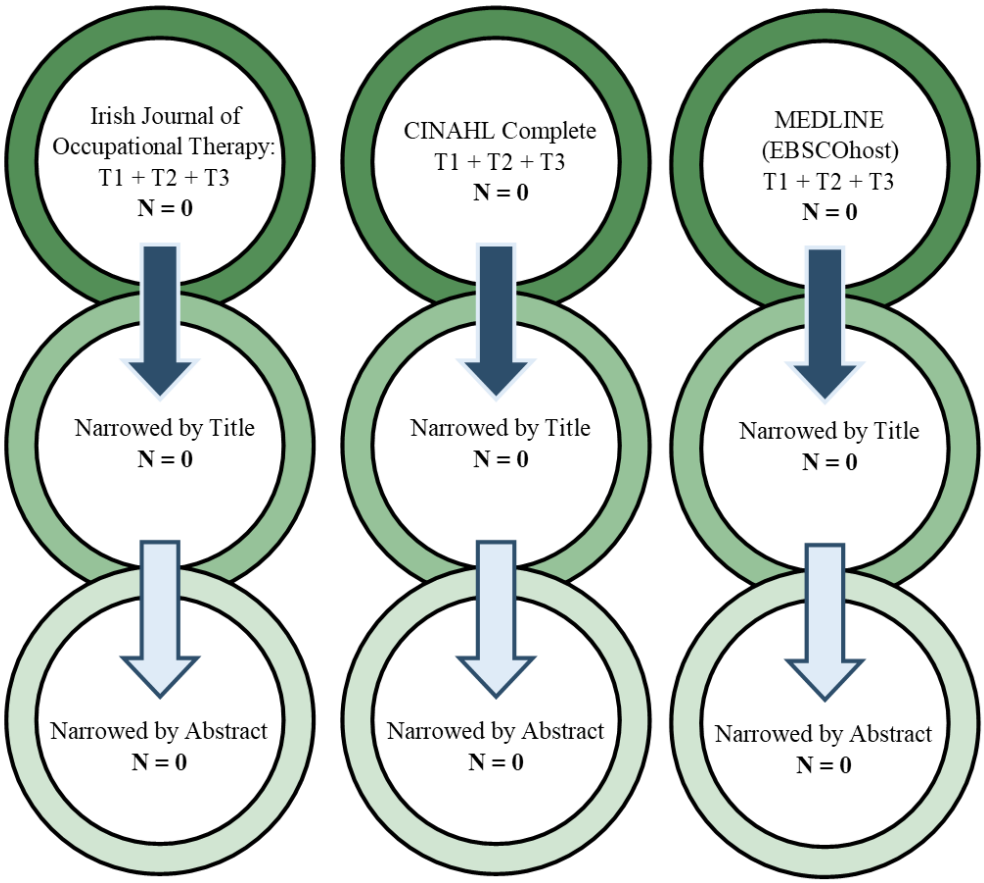


Figure 8.

Chart demonstrating the method of gathering articles for the combination T1 and T2 and T4: Republic of Ireland.

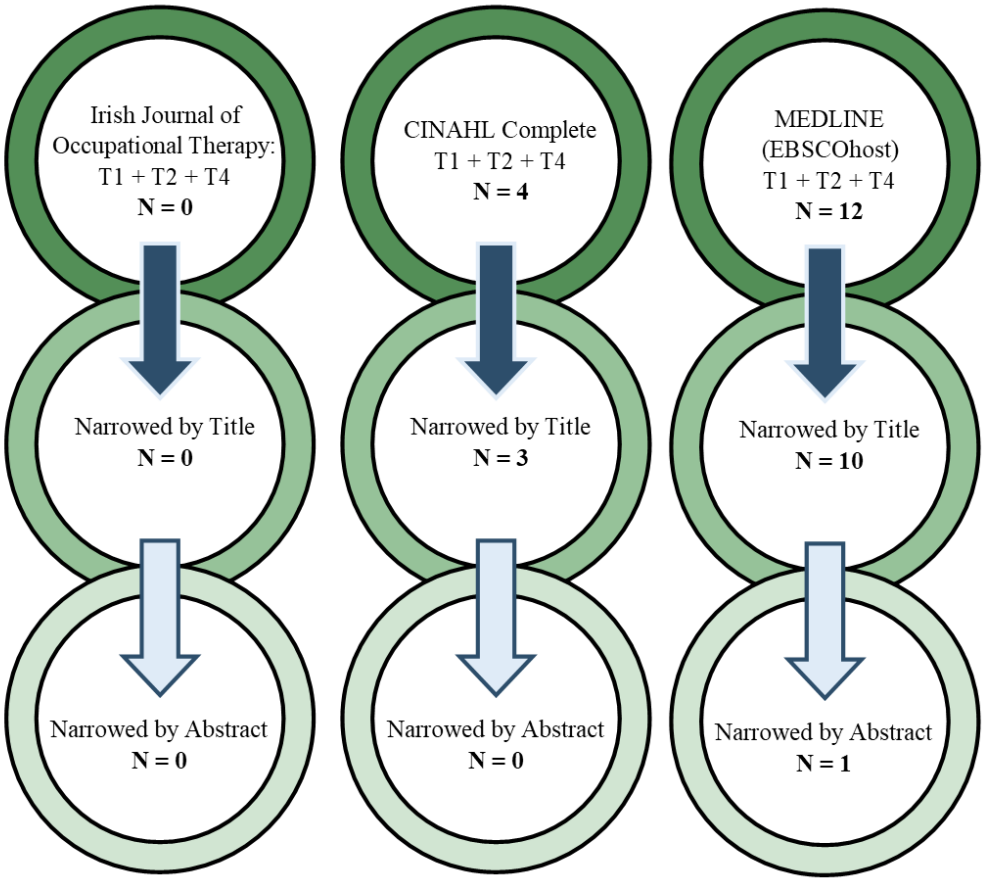


Figure 9.

Chart demonstrating the method of gathering articles for the combination T1 and T2 and T5: Republic of Ireland.

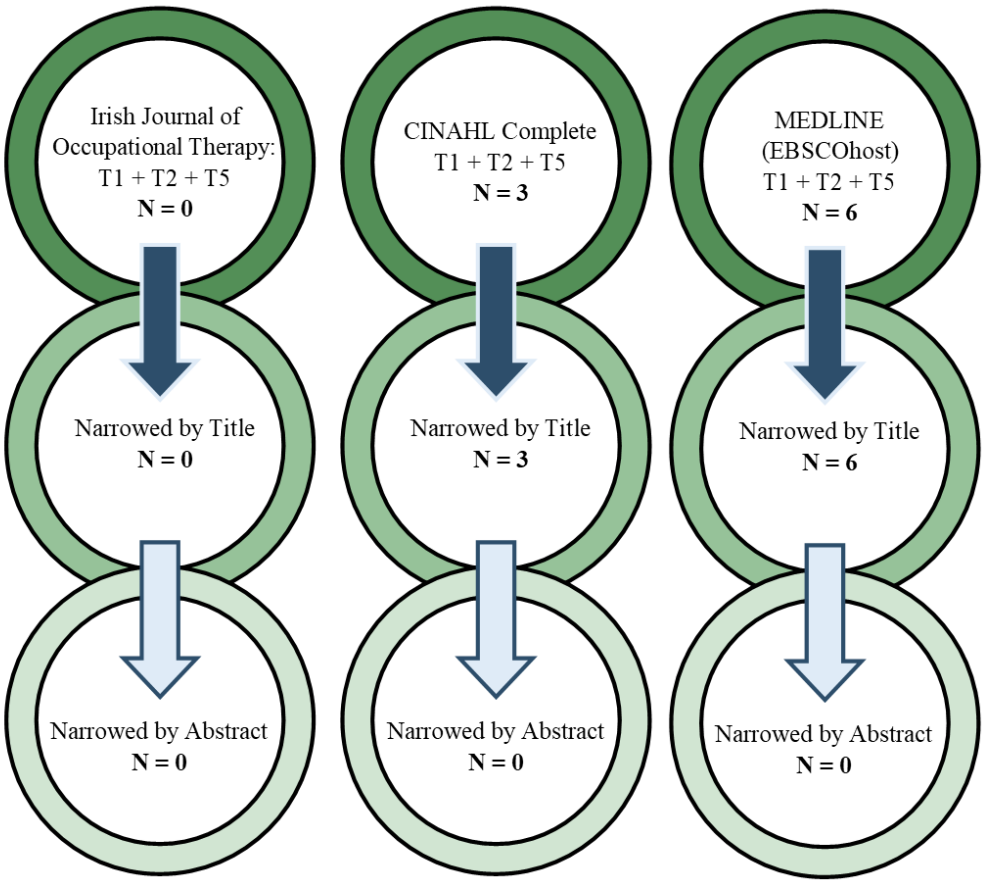


Table 3:

Evidence Table: United States

Authors + Date	**Aim of Study**	**Terminology Used**	**Methodology**	**Results/ Descriptive Themes**	**Key Findings**
Naugler, M. R. & DiCarlo, K. **2018**	Answer 2 research questions: (1) What are interventions that increase neonatal nurses' compliance with safe sleep recommendations? (2) What are interventions that increase prenatal compliance with safe sleep practices after discharge from the NICU?	Sudden infant death syndrome (SIDS)	Integrative review	1st Research Question Themes: (1) Barriers to Compliance (2) Hospital Policy (3) Education for Neonatal Nurses 2nd Research Question Themes: (1) Barriers to Compliance (2) Consistent Education for Parents	AAP Recommendations have changed from 2011 to 2016. This inconsistency in generations has contributed to the noncompliance of caregivers and healthcare providers to safe sleep strategies.

Authors + Date	**Aim of Study**	**Terminology Used**	**Methodology**	**Results/ Descriptive Themes**	**Key Findings**
Patton, C., Stiltner, D., Wright, K. B., & Kautz, D. D. **2015**	Determine whether nurses provide a safe sleep environment for infants in the hospital setting	Sudden infant death syndrome (SIDS) Sudden unexplained infant death (SUID)	Integrative Review	(1) Use of Nonsupine Positioning (2) Nursing Knowledge + Compliance with Safe Sleep Recommendations (3) Fear of Aspiration (4) Nurses' Recommendations - Incorrect Sleep Positioning (5) Effects of Nursing Practice on Parental Behaviors (6) Deficits in Nursing Knowledge about Safe Sleep Recommendations (7) Inconsistencies in Nursing Practice in Implementing Safe Sleep (8) Parental Education Provided by Nurses	Nurses are hesitant to comply with AAP sleep recommendations for 4 reasons: fear of aspiration, infant comfort, advice from family members, and a lack of confidence in recommendations.

Authors + Date	**Aim of Study**	**Terminology Used**	**Methodology**	**Results/ Descriptive Themes**	**Key Findings**
Aitken, M. E., Rose, A., Mullins, S. H., Miller, B. K., Nick, T., Rettiganti, M., Nabaweesi, R., & Whiteside-Mansell, L. **2016**	Determine any association between grandmothers' beliefs/opinions and daily demographic characteristics with following key AAP-recommended sleep guidelines when bedding the infant at the grandmother's house and at the mother's house	Sudden infant death syndrome (SIDS) Sudden unexpected infant death (SUID)	Survey using Convenience Sampling + Logistic Regression Analyses	Table 1: demographic and family characteristics for 256 respondents Table 2: sleep location + position information Table 3: effect of grandmother's beliefs on behavior Table 4: multivariate model results predicting safe sleep behavior at grandmother's house	Grandmothers were more likely to comply with safe sleep recommendations when they were watching the infant in the infant's home rather than their own. There was a lower compliance exhibited when the grandmothers were worried about the infants' comfort or the incidence of choking. This highlights a need for general education and evidence-based guidelines.

Authors + Date	**Aim of Study**	**Terminology Used**	**Methodology**	**Results/ Descriptive Themes**	**Key Findings**
Peacock, N. R., Altfeld, S., Rosenthal, A. L., Garland, C. E., Massino, J. M., Smith, S. L., Rowe, H. L., & Wagener, S. E. **2018**	Urge that safe sleep advocates receive as much support as possible for developing innovative, evidence-based interventions and evaluating their impact	Sudden infant death syndrome (SIDS) Sudden unexpected infant death (SUID)	Qualitative Interviews	Themes: (1) Infant Mortality and Disparities Data (2) Targeting and Tailoring of Campaign Materials (3) AAP Recommendations (4) Theory and Message Framing (5) "Abstinence-Only" Versus Risk Reduction Messaging (6) Evidence of Reach or Effectiveness of Campaigns	Abstinence-only messaging projects fear, guilt, and blame onto parents for a disease with no known cure or cause. Instead, nuanced risk reduction messaging should be utilized as it notes some bed-sharing situations as being more hazardous than others without inflicting guilt or blame.

Authors + Date	**Aim of Study**	**Terminology Used**	**Methodology**	**Results/ Descriptive Themes**	**Key Findings**
Leong, T., Manon, B., Maneesha, A., Terri, M., McFadden, T., Johnson, J., Lazarus, S. G. **2018**	Assess the baseline infant sleep behaviors at a tertiary care freestanding pediatric hospital and evaluate the effectiveness of hospital-based infant safe sleep program in improving adherence to safe sleep recommendations	Sudden infant death syndrome (SIDS) Sudden unexplained infant death (SUID)	Convenience sampling, 1 study conducted	Themes: (1) Crib Audits (2) Sleep Position (3) Sleep Environment & ABC Compliance (4) Crib Card Use & Safe Sleep Adherence (5) Nurse Survey Results	The ABC safe sleep initiative proved effective in promoting compliance in a freestanding pediatric hospital. The campaign encourages parents to place their infants alone, on their backs, in a crib.

Table 4:

Evidence Table: Republic of Ireland

Authors + Date	**Aim of Study**	**Terminology Used**	**Methodology**	**Results/ Descriptive Themes**	**Key Findings**
O'Brien, N. O., McGarvey, C., Hamilton, K., & Hayes, B. **2021**	Assess intentions regarding infant sleeping practices in mothers in Ireland	Sudden infant death syndrome (SIDS) Cot death	Cross-sectional survey Face-to-face questionnaire Analysis by STATA	Subcategories (1) Breastfeeding (2) Unsafe Sleep Position (3) Safe Sleep Position (4) Maternal Smoking (5) Soft Bedding (6) Social Deprivation	The majority of Irish mothers used safe sleep strategies including sleep locations and bedding materials. However, the majority of younger mothers used unsafe sleep strategies.

Results

After extracting data from the articles that met the systematic review search parameters, three themes emerged: safe sleep, barriers to compliance, and improving education. As the information provided from the articles often overlapped with more than one theme, some articles contributed to two themes at times.

Safe Sleep

Based on the literature gathered from the systematic review, considerable similarities were noted between the United States' and Ireland's perceptions of safe sleep. The overall compliance with safe sleep recommendations was similar between the two counties as well. The factors relating to compliance and noncompliance in the United States were also similar to those of Ireland, indicating that SIDS is an international trend requiring international campaigns and messaging.

Leong et al. (2018) refers to safe sleep as an infant being alone, on their back, and in a crib, also known as the ABC initiative. The back, or supine, sleeping position follows the previously named Back to Sleep campaign from 1994. As the name was changed to the safe to sleep campaign in 2012 to also cover sleep location and environment, the ABC mnemonic was implemented into hospitals to prevent SIDS.

O'Brien et al. (2021), while not directly referring to these practices as "ABC," does also reference these practices as safe. The author also, however, emphasizes other risk factors which are not typically in the forefront of information shared in campaigns to parents; these include maternal smoking, soft bedding materials, and social deprivation. The author identified social deprivation as being caused by lower socioeconomic statuses, lack of education, and lack of private insurance, leading to a decrease in compliance with safe sleep recommendations.

Peacock et al. (2018) also alludes to the idea that there is a lack of education in popular public campaigns about some of the risk factors for SIDS. Included in the discussion of various safe sleep protocols are sleeping alone in a crib or other approved sleep surface and refraining from engagement in bed-sharing, especially when the parent is under the influence of alcohol or drugs, when the baby is premature or of low birth weight, or when on a sofa or chair.

A major difference between the United States' and Ireland's safe sleep initiatives is the aspect of co-sleeping. In the United States, the American Academy of Pediatrics recommends bed-sharing only for the purpose of breastfeeding if all blankets and pillows are removed prior; co-sleeping, however, is not recommended, even for the purpose of breastfeeding (Naugler & DiCarlo, 2018). Room-sharing, however, is recommended for at least 6 months - 1 year of age. Ireland, however, while also urging against co-sleeping, allows for specific co-sleeping cots to attach to the parents' beds (O'Brien et al., 2021). This suggests there are various cultural normalities associated with co-sleeping and bed-sharing which could differ internationally from country to country.

Barriers to Compliance

Peacock et al. (2018) reports that in the 2 weeks prior to the survey, 45% of babies had spent an amount of time at night in bed with an adult. Furthermore, 65% of parents reported their baby had slept with them during the first 3 months of life. These statistics exemplify the fact that safe sleep patterns are not being implemented into the home environment. To understand the reason for this occurrence, it is important to trace the problem to the source. Over 98% of women give birth in a hospital, meaning that medical professionals are the ones to touch and handle them first (National Academics of Sciences, Engineering, and Medicine, 2020). Therefore, it is

especially important for medical professionals, and especially nurses who interact the most with the patient and family, are familiar and comply with AAP safe sleep recommendations.

However, it is noted that of the 97% of nurses who stated they were aware of the AAP recommendations, only 67% agreed with the recommendations and only 29% positioned infants in the supine position for sleep (Patton et al., 2015). The four main barriers to nurses' compliance with AAP recommendations noted by Patton et al. (2015) are a fear of aspiration, a concern for infant comfort, conflicting advice from family members, and a lack of confidence in AAP recommendations. Over 51% of nurses who feared infants would aspirate in the supine position tended to place infants in the side-lying position.

This further correlates with a study by Aitken et al. (2016), which investigated grandmothers' beliefs and practices concerning safe infant sleep in the United States. A lower compliance with safe sleep recommendations was noted for grandmothers who regularly cared for their infant grandchildren; lower compliance was also more significant if there were concerns for infant choking or comfort. Interestingly, a higher compliance was noted when the grandmother watched the infant in the infant's home rather than their own. This indicates that the mother or primary caregiver typically abides by safe sleep recommendations and that the grandmother is aware of these in order to comply with them when in the infant's home, but that the grandmother chooses not to comply when in their own home.

Patton et al. (2015) and Aitken et al. (2016) raise the concern of experience vs evidence. Nurses and grandmothers both have experience in caring for infants, but AAP recommendations have changed over the years as new research has been released (Naugler & DiCarlo, 2018). Identification of this problem is the first step to implementing new social campaigns and education interventions for not only nurses, but the general population of caregivers as well.

O’Brien et al. (2021) discusses similar barriers to compliance in Ireland. In this study, the main indicator of noncompliance with safe sleep recommendations was young maternal age, particularly less than 25 years of age. This is mainly due to a lack of education and a mostly lower socioeconomic status, which is a statistically proven higher risk for SIDS. Other barriers included maternal smoking tendencies, maternal education less than post-secondary, medical card possession, intention to use soft bedding and unsafe sleep position, and being of non-Irish heritage.

A lack of education is also noted in Ireland (O’Brien et al., 2021). In the 1990s, the first SIDS reduction campaign was established in Ireland. O’Brien et al. (2021) documents this occurrence in 1992 with the Reduce the Risks of Cot Death campaign, but there is not enough available evidence to conclude whether the American Back to Sleep campaign influenced the Irish campaign or vice versa. What is known about the campaigns is their statistical effectiveness given the dramatic decrease in SIDS rates between 1990 and 2000 as noted by Figures 1, 2, and 3 (Centers for Disease Control and Prevention, 2022; Macrotrends LLC, 2022; Muller-Nordhorn et al., 2020). The first review of this impact in Ireland, however, was not published until 2000, indicating an extreme gap in the literature for almost a decade (O’Brien et al., 2021). This alludes to the lack of education and literature present on which for Irish mothers and caregivers to inform themselves.

Furthermore, O’Brien et al. (2021) demonstrated similar results for Ireland as the United States, as many Irish mothers have proven their awareness of safe sleep recommendations and choose not to comply. O’Brien et al. states:

> Despite 90% of mothers in a previous study stating soft bedding as a SIDS risk, 34.8% of respondents in the current study intend to use soft bedding in their infant's sleep environment. This trend is reflected internationally (2021, pp. 191).

Improving Education

A need for more effective provider, caregiver, and parent education has been clearly stated (Aitken et al., 2016; O'Brien et al., 2021; Patton et al., 2015). Aitken et al. (2016) recommends evidence-based guidelines in order to dispel myths concerning infant safe sleep and promote safe practices. The more evidence that is provided to support new recommendations, the more likely nurses, grandmothers, and other caregivers will be to comply.

Peacock et al. (2018) discusses two types of messaging commonly utilized in safe sleep campaign messaging. The first is described as abstinence-only messaging, which uses strong languages and inflicts guilt and blame. An example of abstinence-only messaging states, "NO EXCEPTIONS: Your baby should ALWAYS sleep safe: Alone. On his or her Back. In a Crib. Every night. Every nap. It's just not worth the risk of your baby dying" (Peacock et al., 2018, pp. 210).

The second type of messaging described by Peacock et al. (2018) is nuanced risk reduction messaging. This type of messaging notes bed-sharing situations as more or less hazardous than others without inflicting blame or guilt. An example of nuanced risk reduction messaging states:

> It's particularly dangerous to sleep with a baby on a couch, with other children sharing the bed, or if you or anyone in the bed is overweight, has been drinking or using marijuana or other drugs, or is taking medicine that causes sleepiness, is

> very tired or ill, is a smoker. (Babies exposed to second-hand smoke are at a higher risk of Sudden Infant Death Syndrome) (Peacock et al., 2018, pp. 210).

Many of the examined safe sleep campaigns used abstinence-only messaging rather than nuanced risk reduction messaging, meaning they intended to inflict fear on the mothers and caregivers (Peacock et al., 2018). While fear can be a strong motivator, it is only temporary and does not provide the education necessary for safety. This is dangerous as SIDS is a disease with an unknown cause and an unknown cure. Inflicting guilt and blame on mothers and caregivers for an ultimately unknown and devastating disease will not provide education or change in handling practices.

Furthermore, Peacock et al. (2018) recommends a change in some of the ambiguity of popular campaigns to promote clearer instructions and highlight lesser-known risks of SIDS. Namely, the study recommends changing the "A" of the ABC campaign, as this could cause confusion between bed-sharing and room-sharing. While the AAP recommends room-sharing, it does not recommend bed-sharing, which are the directions the ABC campaign follows. Peacock et al. (2018), however, proposes changing the "alone" portion of the acronym to a word which is more clear in promoting room-sharing while still discouraging bed-sharing.

The conclusion of evidence-based messaging is supported by the O'Brien et al., stating "educational campaigns need to tackle modifiable risk factors, particularly focusing on younger, non-Irish mothers, with lower educational attainment" (2021, pp. 185). Bringing together ideas from Ireland and the United States, nuanced risk reduction messaging should be utilized, focusing on educating those at the highest risk and highlighting lesser-known risk factors (O'Brien et al., 2021; Peacock et al., 2018).

Discussion

Supplemental Interview

As a supplement to the systematic review, a consultation was conducted with scholar Dr. Thomas Decker, EdD, OTD, OTR/L, who operated an occupational therapy clinic in Ireland for a decade and now works in the United States. He was able to provide insight into both the United States and Ireland's practices and help to piece together the missing pieces of information. Because Ireland does not have the volume or percentage devoted to research that the United States does, Ireland's funding influences their delivery of services. Because of the long waits to receive care in Ireland's socialized medical system, many infants and children do not receive early intervention to occupational therapy services. If infants are not meeting substantial developmental milestones and are referred to occupational therapy, it is imperative they receive treatment in order to remain on track in their development.

This issue is not only relevant to Ireland, but also the United States. In the United States' quasi-market health care system, families who are not eligible for programs such as First Steps have to rely on private insurance or pay out of pocket for occupational therapy services. It is therefore clear that because this problem is present in both health care systems, it is likely present in others globally as well. Neither system is perfect, but the research collected in this study highlights a need for change in this area.

The main takeaway from this consultation is the general cultural tendencies of Irish mothers to actively handle their infants rather than rely heavily on passive handling devices, which is more common in American culture. One possible explanation for this cultural normality is the differences in paid maternity leave between the United States and Ireland. Irish mothers receive 26 weeks of paid maternity leave and can choose to extend their leave an additional 16

weeks without pay (Citizens Information, n.d.). This allows parents to spend more undivided time with their infant, actively hold and handle them, and notice delays in their development. The United States paid maternity leave, however, is typically only about 12 weeks (Masters, 2022).

Discussion of Systematic Review Results

Overall, the United States and Ireland had similar interpretations of safe sleep. The most prominent points can be summarized in the ABC initiative, which promotes infants to sleep alone on their backs in a crib (Leong et al., 2018). Safe sleep goes beyond just these three recommendations and includes an elimination of soft bedding materials, sleeping separate from the parents' bed but in the same room, prevention of overheating, and not sleeping in any sort of seating device other than in a car seat when in a car (Naugler & DiCarlo, 2018). However, Ireland includes co-sleeping cots, which attach to the parents' beds, as a form of safe sleep (O'Brien et al., 2021).

The main barrier to compliance noted was a lack of education in both the United States and Ireland (Patton et al., 2015; O'Brien et al., 2021). While tremendous improvements have been made in educating health care providers, parents, and caregivers on proper infant handling techniques, more education is still needed and will continue to be needed as new research comes forth (Patton et al., 2015). The compliance of nurses ultimately leads to the compliance of parents in the homes, as parents will mimic what they see in the hospital. It is therefore extremely important for health care providers, and nurses especially, to be educated and in constant compliance with AAP safe sleep recommendations. In Ireland, substantial barriers to compliance noted were socioeconomic statuses, young maternal age, maternal smoking, and

having less than a post-secondary education (O'Brien et al., 2021). This promotes education geared directly toward those of higher risk factors and lower education.

In working towards improving education, the research gathered demonstrates a strong need for evidence-based education (Aitken et al., 2016). This will allow parents, grandparents, caregivers, and health care providers with a multitude of experience to understand why the new research for safe sleep is proven to be effective and worth implementing. A proposal to rename campaigns to incorporate all of the new and relevant safe sleep recommendations or create new campaigns has the potential to make substantial positive changes (Peacock et al., 2018). Furthermore, all education, campaigns, and initiatives need to be broadcasted appropriately through nuanced risk-reduction messaging so as to not inflict guilt, blame, or fear onto parents for a disease which currently has no known cause or cure.

Limitations

There were several limitations to this research project. Possible access and search features were problematic to be able to locate specific targeted research. It is assumed that this is due to the lack of literature on the topic, recent changes in terminology, and the researcher being unaware of possible Irish terminology. The lack of literature on the topic of SIDS in Ireland is proven through the systematic review where only 1 relevant article within the past decade was found. It is even more surprising that 0 articles were found from the Irish Journal of Occupational Therapy, indicating a need for research on SIDS from an occupational therapy perspective in Ireland.

Although there was evidence of a past campaign in Ireland in 1992 similar to the United States' 1994 Back to Sleep campaign, there was not enough information provided or found on

the topic to determine whether the campaigns had any influence on one another or if the Irish campaign had any impact at all.

Conclusion

The results from this research study indicate notable similarities and differences in the United States' and Ireland's infant handling practices. While the United States tends to passively handle infants using car seat carriers, Irish mothers tend to actively handle their infants. This is significant as active handling is a protective factor against SIDS and aids in infant development. However, the results indicate that in both the United States and Ireland, there are compliance issues surrounding the safe sleep recommendations. Many of the mothers who demonstrate noncompliance in the United States do so because of the nurses' noncompliance observed while in the hospital post-partum. There is a need for re-education of health care providers, parents, and caregivers of various generations. Re-education should focus on evidence-based practices, new campaigns incorporating all aspects of safe sleep and SIDS prevention, and do so appropriately using nuanced risk-reduction messaging. Future research on this topic can investigate other factors relating to SIDS rates including the COVID-19 pandemic, various cultural normalities, pacifiers/soothers, the detriments or benefits of the side-lying position, and health behavior theories related to evidence based health literacy. Future research should also specifically aim to analyze various infant handling techniques in the NICU for premature infants.

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