

THESIS

PARENTS' TOLERANCE OF RISK IN PLAY AND PARENTS' COUNTRY OF BIRTH
PREDICT CHILDREN'S ABILITIES TO ASSESS RISK: A PILOT STUDY WITH
IMPLICATIONS FOR OCCUPATIONAL THERAPISTS

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In partial fulfillment of the requirements

For the Degree of Master of Science

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Summer 2019

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ABSTRACT

PARENTS' TOLERANCE OF RISK IN PLAY AND PARENTS' COUNTRY OF BIRTH PREDICT CHILDREN'S ABILITIES TO ASSESS RISK: A PILOT STUDY WITH IMPLICATIONS FOR OCCUPATIONAL THERAPISTS

Importance: Many parents do not allow their children to engage in risky play despite its many benefits on health and development. Objective: We investigated to what extent parents' tolerance of risky play predicts children's abilities to assess risk in a virtual street-crossing task. Other factors that were examined include age, sex, motor coordination, mothers' education level, and parents' country of birth. Design: Correlational, cross-sectional pilot study. Participants: Nineteen children (11 boys, 8 girls; M age = 8 years) and their parents (9 immigrant; 10 native to U.S. or Canada) Outcome and Measures: Tolerance of Risk in Play Scale (TRiPS); Motor Assessment Battery for Children (MABC-2); and virtual street-crossing task where we evaluated frequency of hits and close calls from virtual cars. Results: Parents' tolerance of risky play significantly predicted hits and close calls on the virtual street-crossing task ($R^2=.29$, $F(1,16)=6.52$, $p<.05$). When all variables were forced into the regression analysis, parents' country of birth was the only significant predictor of hits and close calls ($R^2=.304$, $F(1,16)=6.99$, $p<.05$). There was a strong correlation between parents' tolerance of risky play and parents' country of birth ($r=.704$, $p<.01$). Conclusions and Relevance: There was a co-occurrence for both parents' tolerance of risky play and country of birth as significant predictors of hits and close calls. This suggests that children whose parents have a higher tolerance for risky play are more likely to demonstrate safe pedestrian behavior. Additionally, children whose parents are

immigrants, especially from Mexico, may be less likely to tolerate risky play, which may have a negative effect on children's abilities to cross the road safely. What This Article Adds:

Occupational therapists can use these findings to encourage risky play opportunities through parent education to enhance children's abilities to assess risk and reduce chance of pedestrian injuries.

ACKNOWLEDGEMENTS

First and foremost, I would like to thank my thesis adviser, Dr. Anita Bundy, for your guidance, support, and wisdom. It has been a true honor to be your student and to share your passions for research and play. Thank you to my thesis committee, Dr. Jaclyn Stephens for your diligence and insight throughout this project, and to Dr. Gene Gloeckner for your wisdom and patience in helping me understand the nitty-gritty of statistics. Thank you to my family and friends for loving me during both the stressful and celebratory times. To my friends I have made through this program, thank you for sharing this journey with me and all of the times of trial and triumph that came with it. Finally, thank you to my mom and dad for the unending support, for helping me get to where I am today, and for encouraging me to take risks and believe in myself.

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CHAPTER 1: INTRODUCTION

The purpose of this study was to determine to what extent parents' tolerance of risky play predicts children's abilities to act responsibly in an everyday task as measured through a virtual reality task. Children have shown to be risk competent and take into account their own abilities before engaging in a risky task (Christensen & Mikkelsen, 2008). Despite this, many parents fear that the likelihood of physical injuries occurring is greater than it used to be, especially if a child is left unsupervised (Malone, 2007). As a result, children today experience a phenomenon sometimes referred to as "bubble-wrapping," which excessively minimizes the risk of injury, especially during play. As occupational therapists, we know that play is a major part in how children learn new skills such as building relationships, taking care of oneself, and adapting to the world (Burghardt, 2005). Research is beginning to find that risk in play serves many benefits for childhood health and development (Brussoni et al., 2015). This study aimed to show that when parents have a higher tolerance for risk in play, children can learn to assess and manage the risks that occur in their day-to-day lives.

The Allure of Risky Play

Ever since I first learned about occupational therapy, I knew I wanted to work with children. I became interested in this thesis topic not only because it focused on child development, but the idea of risk-reframing also resonated with me. Growing up in a small town in the Midwest, I felt like the world was my playground. My mom and dad were lenient, but within reason. I was not an adamant risk-taker, but I valued my independence and the freedom to test the limits. It was not until I grew older and went to college when I learned that people grew up much differently than I did. When I took on babysitting jobs and taught swimming lessons, I

felt like I was on pins-and-needles if the child got so much as a scratch. By taking on this thesis project, it was a way that I could show the world that risk-taking in play can be a good thing. With this end, I hope to make a difference for children so they can have more opportunities to engage in exciting and thrilling forms of play. As I complete my master's degree as an occupational therapist, I hope to carry on what I have learned from this project and educate parents and other therapists.

Overview of Thesis

In Chapter 2, I will present an extended review of the literature on risky play. This review is divided into two parts, including the benefits and detriments of risky play. Chapter 3 comprises a journal article formatted for the *American Journal of Occupational Therapy*. Finally in Chapter 4, I provide a synthesis of the project including a general discussion of the findings, implications for future research, and personal reflections.

CHAPTER 2: EXTENDED LITERATURE REVIEW

In the following review of the literature, I discuss the existing research on the benefits and detriments of risky play as there appears to be substantial evidence for both perspectives. I first identify research that supports the benefits of risky play and how it influences children's health and behaviors. Within this section, I critique literature that supports risky play and its influence on children's ability to manage risk, as this was focus of the present study. Secondly, I present the current literature on the detriments of risky play. This is important to consider as we move forward, as high levels of risk can lead to physical injuries (Dowswell, Towner, Simpson, & Jarvis, 1996). These incidences suggest that children may have difficulty assessing risk (Joshi, Maclean, & Stevens, 2018), which may also influence parents' tolerance of risky play. From this, I elaborate on common approaches for injury prevention and where risky play is situated in this domain. Finally, I identify the current state of the research and the implications that have led to the present study.

I obtained literature from the following databases: CINAHL, Google Scholar, MEDLINE, ERIC, and PsycINFO. The following search terms were used to find current research on risky play: risky play, free play, risk taking, independent play, outdoor play, injury prevention, safety, children, risk management, risk assessment, risk perception, risk appraisal, decision-making, and problem-solving. I also obtained literature through reference lists of relevant studies.

Benefits of Risky Play

There is some evidence to show that risky play is beneficial to children's health and development (Brussoni et al., 2015). Researchers have focused on improving health-related

outcomes such as physical activity, social skills, emotional regulation, and cognitive abilities. Evidence has supported controlled risky play interventions that increase physical activity and improve social skills (Bundy et al., 2017), and there appears to be preliminary evidence (Sandseter & Kennair, 2011) for the influence of risky play on mental health and cognitive abilities, including the ability to assess risk (Lavrysen et al., 2015).

Risky Play Increases Physical Activity

An environment that provides opportunities for risky play has the potential to increase physical activity in children (Bundy et al., 2017). In one cluster-randomized controlled trial, researchers (Bundy et al., 2017) used a playground-based intervention to increase physical activity, play, and social skills in children. For the intervention schools, researchers placed recycled materials with no obvious play value on the playgrounds, including old car tires, milk crates, hay bales, and Styrofoam coolers filled with sand or other heavy material. The control schools continued with their current playground environments, whether that was traditional playground equipment or no equipment at all. Results from the study showed an increase in physical activity in the intervention schools compared to control schools. This study also suggested that this type of altered environment has the potential to increase time spent in play, as the small to moderate effect size ($d=.27$) supported clinical significance of the intervention. However, these findings on time spent in play did not reach statistical significance ($p=.08$), which the authors argued may have been an artifact of the way the data were collected.

Bundy et al. (2017) provided evidence that a risky play intervention can improve physical activity levels in children. Other studies examining risky play and physical activity are mostly observational (Brussoni et al., 2015). Brussoni et al. (2015) conducted a systematic review, which examined independent mobility and its relation to physical activity. Independent mobility

is described as children's ability to move around in their neighborhood unsupervised by an adult and is considered a type of risky play where children could disappear or get lost (Sandseter, 2007). Brussoni et al. (2015) concluded that independent mobility was positively related to physical activity, minutes of moderate to vigorous physical activity, light activity, total activity counts, activity counts per minute, and self-reported likelihood of playing outside every day.

Based on the evidence, it appears that altering a play environment and allowing for independent mobility can increase physical activity in children (Brussoni et al., 2015; Bundy et al., 2017). In other words, giving children the freedom to explore their own environments and make their own decisions can help them become more active and potentially have long-term effects on their health.

Risky Play Influences Development of Social Skills and Emotional Regulation

In addition to increased physical activity, risky play has the potential to improve social skills in children and their ability to regulate emotions (Bundy et al., 2017; Brussoni et al., 2015). Whitebread (2017) argued that opportunities to be autonomous can produce a positive stress in children that pushes them to be more social. This stress during risky play comes from a level of uncertainty, which gives children the freedom to make decisions, learn from others and their environment, and ultimately improve their abilities to form relationships and regulate emotions (Whitebread, 2017; Burdette & Whitaker, 2005).

In addition to social development (Whitebread, 2017), Gray (2011) argued that there may be a relationship between free play and mood disorders. Specifically, Gray (2011) hypothesized that the rise of psychopathology in children could be attributed to the decline in free play. The increase in adult-directed activities, parents' fears of everyday risk, and the rise in technology have led to fewer children playing outdoors, while there appears to be a simultaneous increase in

children experiencing depression and anxiety-like symptoms. These symptoms are commonly characterized by children having difficulty in regulating emotions and maintaining social relationships (Gray, 2011).

To support the argument that more opportunities for autonomy and risky play are related to better social skills and the ability to regulate emotions, researchers have conducted qualitative studies, correlational studies, and systematic reviews. In their study, Bundy and colleagues (2009) conducted semi-structured interviews after a risky play intervention and found that teachers reported anecdotally that children were more social, resilient, and less aggressive following the intervention. In an observational study, Prezza et al. (2001) found a positive relationship between social health and the type of risky play where children could potentially disappear or get lost. The researchers concluded that independent mobility and autonomy allow children to play more often with peers, play with school mates, and play with neighborhood children compared to children who do not receive opportunities for independent mobility. In a systematic review, Brussoni et al. (2015) examined three types of risky play (i.e., disappear/get lost, great heights, and rough and tumble play) and their effects on social competence and aggression. Conclusions from the review suggested that risky play has the potential to enhance social competence and reduce aggression in children.

The aforementioned studies provide preliminary evidence about the relationships between risky play, social skills, and emotional regulation. However, future studies should include controlled methods and valid outcome measures to determine if there is a causal relationship among these factors.

Risky Play Influences Cognitive Development

Play serves a crucial role in cognitive development as it helps children learn about themselves, their peers, and the world around them (Golinkoff, Hirsh-Pasek, and Singer, 2006). Burdette and Whitaker (2005) argued that research on free play should focus on understanding how it influences executive functioning, a broad cognitive skill that involves attention, impulse-control, and problem-solving. By improving executive functioning skills, children can fully engage in daily activities, cooperate effectively with peers, and enhance their formal learning process (Burdette & Whitaker, 2005).

Most of the research that has investigated the relationship between risky play and cognitive development is based on surveys or interviews of teachers. For example, in one study (Bundy et al., 2009) after a risky play intervention, teachers reported anecdotally that children appeared to improve in decision-making and creativity. According to a 2010 survey by the National Wildlife Federation, 78 percent of educators felt students who spend regular time in unstructured outdoor play are better able to concentrate, and 75 percent felt students who spend regular time outdoors are more creative and better problem solvers (Coyle, 2010).

Some research has aimed to identify a correlation between greater autonomy and cognitive skills (Barker et al., 2014). In a cross-sectional study, researchers (Barker et al., 2014) found that when children engage in less-structured time in their daily lives, they are more likely to perform better on tasks that require self-directed executive functioning. For this study, less-structured activities were defined as activities with limited adult organization, including free play, family and social events, reading, drawing, and media time. Structured activities were defined as any time outside of formal schooling that was organized and supervised by adults. This observational study provided insight to the idea that giving children the opportunity to

manage their own time and engage in their desired activities may influence their ability to problem-solve. This notion is closely related to risky play where children are allowed to be autonomous and make their own decisions.

Children's capacity to perceive and manage risk. If children are given the opportunity to make their own decisions through risky play, perhaps they can engage in active problem-solving and come up with risk management strategies to mitigate harm (Barker et al., 2014; Brussoni et al., 2012). Sandseter and Kennair (2011) theorized that through repeated natural and progressive exposure to fear-inducing stimuli, such as great heights, risky play serves an adaptive function in reducing fear of the stimuli. They argued that children will not experience their ability to cope with fear-inducing situations if they are not provided with sufficient risky play opportunities.

Some researchers have explored how children perceive risk and if they are able to learn ways to manage risk as a result of risky play experiences (Christensen & Mikkelsen, 2008; Little & Wyver, 2010). In their qualitative study, Christensen and Mikkelsen (2008) interviewed 10- to 12-year-old children and observed their time spent in play. The researchers concluded that when managing risky situations, children take into account their individual capacities to help them decide whether or not to partake in the situation. Children are not only willing to take risks, but they are also capable of attending to the potential dangers, assessing their own abilities in relation to those dangers, and coming up with solutions to engage – or not engage – in the risk-taking behaviors.

In a similar study, using a mixed method design, Little and Wyver (2010) interviewed younger children, ages 4- to 5-years, to understand their perceptions of risk and risk-taking behaviors. The researchers also measured the children's risk appraisal using illustrations of three

typical play activities, with each activity varying in level of risk. The results showed that majority of the children were able to accurately depict the “risk” scenarios (74% of children) from the “no risk” scenarios (85% of children) in the risk appraisal task. However, the participants had greater difficulty judging the severity of potential injury that could result from the risky scenarios.

It is evident from this research that children are capable of attending to danger and coming up with ways to manage the risks, even if they have difficulty judging the severity of injury. This is concurrent with research on risk development which suggests that children are able to conceptualize probability and make predictions about the possible consequences of risk-taking (Boyer, 2006). These studies are valuable in that they provide insight into children’s capacity to assess risky situations, and they suggest ways to measure these perceptions of risk. However, these studies are observational and do not provide a clear picture on how risky play experiences can improve children’s ability to perceive and manage risk.

Lavrysen et al. (2015) conducted an intervention to investigate if increased experience with risky play led to increased ability to competently manage risky situations. They gave two classes of 4- and 6- year-old children an intervention involving arduous risky play situations; two age-matched classes served as controls. The activities of the intervention were based on Sandseter’s (2007) six categories of risky play and were implemented into the children’s regular school routine during gym and class time. After 3 months of intervention, the researchers measured risk perception and risk competence in both the intervention and control groups. According to Lavrysen et al. (2015), risk competence can be defined as the ability to see opportunities in a risky situation and assess the need to either engage in the activity, modify the activity to make it more manageable, or not participate. The researchers developed their own

instrument to measure risk competence called the Risk Perception Test. The Risk Perception Test involved a change-detection paradigm, with 20 pairs of alternating images on a screen representing the six categories of risky play. Each pair of images differed in one or more aspects, which made the situation either more risky or not risky at all. Greater risk competence was indicated when a participant had faster response times in detecting risky situations. Additionally, the researchers used a questionnaire for teachers and trained observers to measure five factors of risk competence on the playground: social competence, self-esteem, (low) conflict sensitivity, concentration and motor control. According to the results, children who engaged in the risk intervention throughout a 3-month period showed improvements in risk competence and risk perception. They also found the Risk Perception Test to be a promising measure for risk competence in children, indicated by a high internal reliability ($p < .01$) among all risk competence measures used. Based on the findings from the teachers' questionnaire and observations, children are more likely to develop risk competent behavior when they are engaged in play and experiencing high levels of self-esteem, low sensitivity to conflict, and better concentration.

Through experimental methods, this study provided a fair indication that a risky play intervention can help children become more competent when managing risk (Lavrysen et al., 2015). Lavrysen and colleagues (2015) also developed a promising tool to measure risk perception and risk competency. However, the instruments used to measure these skills do not measure performance on a task, but rather asked children to detect risky situations using alternating images or drawings. There is currently no research that examines risky play and children's risk-assessment skills based on performance in a risk-simulated task.

The current literature shows some evidence that risky play opportunities can improve risk assessment skills. However, there is currently no evidence to show the impact that parents' perceptions of risk have on children's development of risk assessment skills. Future research needs to explore if parents' tolerance of risky play is as influential as a risky play intervention implemented in the school setting. In addition, it is important to assess how older children, ages 7 to 9, perceive and manage risk as a result of risky play experiences, as there is limited evidence for this age group. As children grow up, they typically gain greater autonomy and perhaps more opportunities for risky play (Sandseter, 2011).

With the growing body of literature on risky play, there appears to be substantial evidence of its benefits on improved physical activity, social skills, and emotional regulation. (Brussoni et al., 2015). More rigorous methods, such as risky play interventions have shown to have a promising impact on these outcomes (Bundy et al., 2017). Additionally, there appears to be preliminary evidence of risky play interventions that can improve children's ability to accurately perceive and competently manage risk (Lavrysen et al., 2015). However, there appears to be no longitudinal evidence of the benefits of risky play, particularly how it may influence children's ability to manage risk as they grow up.

Detriments of Risky Play

Despite the many benefits of risky play, there are also consequences of risky play that should be considered in regard to children's safety (Dowswell, Towner, Simpson, & Jarvis, 1996). Each type of risky play described by Sandseter (2007) has its own set of consequences depending on the nature of the activity. The consequences of concern include the risk of physical injury, bullying, abduction, and death (Dowswell et al. 1996; Francis, Martin, Wood, & Foster, 2017; Jenkins, 2006).

Risks of Play at Great Heights

According to the Centers for Disease Control, unintentional injury is by far the leading cause of pediatric mortality, including motor vehicle accidents, drowning, falls, burns, and suffocation (Borse et al, 2008). The risk of falls can greatly increase when a child plays at great heights, whether that be next to steep cliffs or on the playground (Sandseter, 2007). In fact, the most common physical injuries on playgrounds, such as fractured bones, are caused by falls from playground equipment (Tinsworth & McDonald, 2001).

Each year in the United States, more than 200,000 children ages 14 and younger are treated in emergency rooms for playground-related injuries (Tinsworth & McDonald, 2001). According to Tinsworth and McDonald (2001), 75% of nonfatal injuries occur on playground equipment at schools and daycare centers. Richmond, Clemens, Pike, and Macpherson (2018) also found that critical fall heights, non-impact-absorbing surfaces, and lack of guard rails on playground equipment can lead to physical injuries in children. The U.S. Consumer Product Safety Commission (2010) identified playground hazards that can lead to injury or death in children, such as sharp corners or objects, tripping hazards, excessively high equipment surfaces, and non-absorbent surfacing materials surrounding equipment.

Tree climbing is another example of risky play at great heights where children have the potential to injure themselves (Gull, Goldstein, & Rosengarten, 2017). Physical injuries from this activity can vary from less severe, such as scraping an elbow, to more severe such as a broken bone or concussion. In a survey of 1,123 parents with children ages 3 to 13 years, 94 percent reported that their child had scraped an elbow or knee as a result of climbing a tree; about 3 percent suffered a fracture or broken bone; and less than 1 percent experienced a dental injury. Unfortunately, 1.6 percent of parents reported a concussion, 0.5 percent reported a coma, and 0.5

percent reported a fatality. Various other injuries reported by parents included twisted or sprained ankles, splinters, stitches, bee stings, bug bites, abrasions, bruises, or tongue biting. While the more severe consequences of climbing a tree are rare occurrences, it is still a concern for parents that their children are managing this risk safely.

Risks of Play at High Speeds

Play at high speeds is another category of risky play that raises concerns for children's safety (Sandseter, 2007). Sledding down a steep hill, riding a bike, and swinging fast in a playground swing are all examples of risky play at high speeds. Riding a bike at high speed raises the risk for injuries such as abrasions, lacerations, contusions, fractures, dislocations, sprains, and traumatic brain injuries (Rivara, Thompson, & Thompson, 2015). One study reported that in a sample of 3,390 injured cyclists admitted to the emergency room, 43 percent were under 13 years old, suggesting that bicycle-related injuries are a concern for this young population. About half of all bicycle crashes occur due to a loss of control and hitting the ground (Rivara, Thompson, & Thompson, 2015). In some instances, these crashes occur because the individual is riding at full speed. Riding a bike at a speed greater than 15 miles per hour can increase the risk of severe injuries by nearly 40 percent (Rivara, Thompson, & Thompson, 2015). Children under the age of 12 are more likely to obtain severe injuries when riding a bike at high speed. While majority of bicycle-related injuries in children are less severe, it is evident that this form of play may be dangerous for children when it is performed at high speeds.

Risks of Play near Dangerous Elements

Swimming, roasting marshmallows, playing in the ocean, or playing with fireworks are all examples of risky play near dangerous elements (Sandseter, 2007). Among individuals ages 1 to 14, drowning remains the second leading cause of unintentional injury-related death behind

motor vehicle crashes (Center for Disease and Control, 2016). Drowning can occur anywhere there is a body of water, with or without lifeguard or parent supervision (Pelletier & Gilchrist, 2011). Even a near-drowning experience can result in long-term disabilities such as memory problems, learning disabilities, or permanent loss of basic functioning (Center for Disease and Control, 2016).

Firework-related injuries also remain a concern for children engaged in risky play. From 1990 to 2014, an estimated 136,991 individuals under the age of 20 were admitted to United States emergency departments for fireworks-related injuries (Billock, Chounthirath, & Smith, 2017). The average age of these patients was 10 years and the majority were male. Children under the age of 5 were more likely to be injured by sparklers, while children and adolescents 5 to 19 were more likely to be injured by firecrackers.

Risks of Play Where Children Can “Disappear” or Get Lost

In addition to physical harm, parents are also concerned with the risk of children encountering strangers and being bullied by other kids during play (Francis, Martin, Wood, & Foster, 2017). Under Sandseter’s (2007) six categories of risky play, these risks may be more likely to occur when a child can disappear or get lost during play. A qualitative study that consisted of parent interviews found that parents were mostly concerned for their child’s safety due to the risk of encountering strangers, teenagers, and road traffic in route to a place of play – which limited the available places a child could engage in outdoor play and the amount of autonomy given to the child (Veitch, Bagley, Ball, & Salmon, 2006).

Risks of Rough-and-Tumble Play

Another study implemented an intervention that provided increased opportunities for risky play and examined its effects on bullying. In this randomized control trial, 8 schools

changed their playground environment, including opportunities for rough and tumble-play, reduced rules, and added loose materials with no or minimal play value. Eight schools served as the control with no change to the playground environments. The researchers found that while children in the intervention schools reported greater happiness and socialization, the children also reported greater incidence of pushing and shoving. The intervention teachers noticed more bullying within 1 year. Bullying was defined as repeated, negative, and intentional behavior directed at another person who has difficulty defending him- or herself due to an actual or perceived power imbalance. However, the intervention group was less likely than the control group to tell the teacher. The researchers argued that the increase in happiness and socialization outweighed the impact of greater physical contact, and that it was not substantial enough for teachers, parents, or kids to view the playground environment as unsafe (Farmer et al, 2017). Despite this argument, it is important to consider that rough and tumble play has the potential to lead to greater physical contact, thus being perceived by some as bullying and causing physical or emotional harm.

Children's Faulty Perceptions of Risk and Optimism Bias

Playing on high playground equipment, climbing trees, riding a bike, swimming, and less supervision during play are only a few examples of risky play that can lead to physical injuries in children (Sandseter, 2007). A factor that may be contributing to unintentional injuries could be that children have difficulty assessing the risks within play and daily activities (Joshi, Maclean, & Stevens, 2018). As discussed previously, children have shown some level of skill when it comes to risk perception and risk management (Christiansen & Mikkelsen, 2008; Little & Wyver, 2010). However, one study showed that children underestimate how often accidents occur and may be unrealistically optimistic when it comes to their own abilities and the chances

that the accident could happen to them, a concept known as optimism bias (Joshi, Maclean, & Stevens, 2018). In this study, researchers used cartoons depicting a 10-year-old child engaged in daily activities, encountering potential hazards in school, the road, and at home. Children, ages 10 to 11, were asked to rank how often the accidents happen to children their age. They were also asked how likely each accident could happen to them in comparison to their peers.

According to the results, the children in the study underestimated the frequency of accidents in activities such as riding a bike, jumping on a trampoline, and crossing the street. Children also showed optimism bias, estimating their own risks as lower than their peers, especially in the case of pedestrian accidents. Seventy-six percent of participants who rated themselves as less likely to be involved in a pedestrian accident attributed this to their own skill levels (e.g. 'I have practiced crossing the road/I am very careful/I would always look'). Similarly, 77% of participants who rated themselves as less likely to experience drowning stated that they were good swimmers or had taken courses to learn the necessary skills. Other explanations for being optimistic included the lack of opportunity to experience risk or lack of control over the environment, such as having an adult who would help them cross the road.

This study offers insight in how children perceive risks in daily life in relation to their own abilities and the likelihood that they believe they would encounter these situations (Joshi, Maclean, & Stevens, 2018). It is important to note that some children believe they do not have enough control to make their own judgments or even the opportunity to experience risk. The occurrences of unintentional injuries in children could be attributed to this lack of experience with risk combined with optimism bias and the tendency to be overly confident in one's abilities.

Efforts in Reducing Risk of Injury

Injury prevention, which involves keeping children free from the risk of injury, plays a key role in promoting children's safety (Brussoni, Olsen, Pike, & Sleet, 2012). In previous years, researchers have made an effort to reduce the number of physical injuries to children by modifying playground environments. One program aimed to reduce the number of injuries on 24 school playgrounds in the Midwest by installing safe surface material around equipment and providing injury prevention training to school staff (Olsen, Hudson, & Thompson, 2013). After the installation of surface material and staff training, there was a 30% reduction of all playground injuries and a 70% reduction of severe injuries in need of medical treatment. This study highlights the importance of providing safer surfacing material on playgrounds to reduce the risk of physical injury in kids. Other studies have supported the need to provide a safer environment on playgrounds, including the installation of impact-absorbing material to surfaces and adjusting fall heights to 1.5 m or less (Richmond, Clemens, Pike, & Macpherson, 2018).

Along with environmental modifications, many parents believe they can reduce the risk of injuries through increased supervision and education on hazard-recognition (Richmond, Clemens, Pike, & Macpherson, 2018; Schnitzer, Dowd, Morrongiello, & Kruse, 2012). However, there are mixed results associated with playground interventions aimed at reducing risky behavior through increased supervision and hazard-recognition by adults (Richmond, Clemens, Pike, & Macpherson, 2018). In a systematic review, two out of four studies showed a decrease in risk-taking behavior on the playground after hazard-recognition interventions were implemented, with the other two studies showing null effects. Research has also examined the effects of increased adult supervision on risk-taking behaviors and injuries. There has been no evidence to

show that increased adult supervision correlates with decreased number of injuries that occur on the playground.

While some interventions that focus on environmental modification and reduction of risky behaviors have reduced physical injuries in children, it is essential to analyze the costs and benefits of such extensive and costly interventions (Richmond, Clemens, Pike, & Macpherson, 2018; Ball, 2004). For example, researcher David Ball (2004) weighed the risk-benefit trade-offs of providing safer surfacing for public playgrounds in the United Kingdom to reduce the risk of physical injuries in children. From his analysis, Ball (2004) concluded that an intervention such as this would not be effective on its own to reduce the already minimal occurrences of playground-related injuries in the UK. He argued that the safer surfacing of playgrounds would be too costly and not worth the time and effort.

Summary of Literature Review

The current state of the literature suggests that risky play can serve many benefits for children (Brussoni et al., 2015), but there is also a concern for the negative consequences of risky play. The benefits of risky play, including increased physical activity, have been explored through randomized controlled trials (Bundy et al., 2017). Other benefits, such as social skills (Whitebread, 2017), emotional regulation (Gray, 2011), and cognitive skills (Barker et al., 2014; Burdette & Whitaker, 2005) have been supported anecdotally and through correlations. More rigorous methods, as well as longitudinal evidence, are needed to support these benefits. With the current state of the literature, there is no evidence to suggest that a lack of risky play can lead to significantly negative consequences for children's health and development. In addition, there is no evidence for the level of impact that parents' tolerance of risky play has on these outcomes.

The review of the detriments of risky play suggests that risky play can lead to various physical injuries, depending on the nature of the activity (Dowswell, Towner, Simpson, & Jarvis, 1996). However, the injuries that occur from risky play are fairly minimal and do not pose a significant concern for children. In regard to implications, Brussoni, Olsen, Pike, and Sleet (2012) suggested that future researchers and practitioners should focus on injury prevention that also supports opportunities for healthy risk-taking in play.

CHAPTER 3: PARENTS' TOLERANCE OF RISKY PLAY AND PARENTS' COUNTRY OF BIRTH PREDICT CHILDREN'S RISK ASSESSMENT SKILLS

In today's society, there has been an increased concern about the risks in everyday life (Tulloch & Lupton, 2003). By definition, risk is the "possibility of loss or injury" and is often considered to be relative to the observer (Kaplan & Garrick, 1981). While some people see risk as a form of opportunity and adventure, others perceive risk as associated with uncertainty, insecurity, and loss of control over the future (Lupton, 1999; Tulloch & Lupton, 2003). While science throughout the years has aimed to identify risks through strategic observation, measurement, and calculations, western societies have taken the concept of risk and dramatized it within the public sphere (Beck, 1992). The heavy influences of social and cultural norms, along with personal experiences of risk, have led people to focus on the negative outcomes of risk, and make irrational assumptions out of fear of the unknown (Lupton, 1999). This heightened awareness influences the way that many people manage risks in daily life, often leading to risk-avoidant behaviors (Tulloch & Lupton, 2003). Such behavior tends to be valued as the responsible way to manage risks more-so than behavior that involves greater risk-taking. Such is true for the ways in which many parents, teachers, and other adults view risk in the lives of children (Malone, 2007; Niehues, Bundy, Broom, & Tranter, 2016).

Increased awareness and fear of risk have kept many parents from allowing their children to experience risk in daily life, especially in play – an important occupation for children (Brussoni, Olsen, Pike, & Sleet, 2012). Some parents are concerned that the world we live in today is much more dangerous compared to when they were children (Niehues, Bundy, Broom, & Tranter, 2016). As a result, they will not allow their children to experience many of the same

activities they experienced as children, such as riding bikes in the neighborhood without supervision or playing on a beach with friends. While some fathers may value the benefits of risk-taking and are less likely than mothers to intervene in situations involving risk, others believe it is part of their fatherly role to ensure safety in their children's lives and do everything they can to prevent injury (Creighton, Brussoni, Oliffe, & Olsen, 2017).

In addition to the heightened awareness of risk, parents may be fearful that others are judging their parenting styles and are very concerned about being viewed as 'good parents' (Niehues et al., 2016). Similarly, teachers often wrestle with fear of liability if children were to injure themselves at school and frequently avoid situations where injuries could occur (Bundy et al., 2009). These perceptions of risk in children's lives have led to an increased focus on injury prevention, which has limited children's experience with risk, especially during play (Brussoni et al., 2012).

From an occupational therapy perspective, play is an essential way for practitioners to help children learn the skills they need to be competent and functional in their daily lives (Bundy, 1993). Children are more likely to acquire new skills if they are given some agency to direct their own learning, an appropriate amount of challenge, and if the opportunities to play are within a supportive social context (Bundy, 1993; Vygotsky, 1978). Within the past two decades, researchers have uncovered the health and developmental outcomes of play when it involves greater risk-taking (Brussoni et al., 2015). Researcher, Ellen Sandseter (2007), coined the term "risky play," and defined it as "thrilling and exciting forms of play that involve a risk of physical injury" (Sandseter, 2011, p. 258). It most often occurs outdoors and in free play with limited adult supervision and organization. Sandseter (2007) further categorized risky play into six domains, including: play at great heights, play with high speed, play with harmful tools, play

near dangerous elements, rough-and-tumble play, and play where children can “disappear” or get lost. Emerging evidence is beginning to show that risky play can help increase engagement in physical activity (Bundy et al., 2017) and has positive effects for building resiliency, creativity, social competence, and reducing aggression (Brussoni et al., 2015). Despite this evidence, there has been a concern that children are not presented with enough opportunities to engage in this type of play (Malone, 2007).

Parents’ fear of risk is not the only factor that has contributed to the decline of outdoor, risky play. With greater access to mobile devices, tablets, and computers, children are deciding to stay indoors to spend their time (Anderson, Economos, & Must, 2008). Children in western societies devote only 4 to 7 minutes per day to unstructured outdoor play, such as taking a walk, playing a game of catch, or climbing trees (National Recreation and Park Association, 2010); instead, they consume most of their day in front of electronic media. According to a 2011 report, children younger than 8 years spent an average of about 2 hours per day in front of some type of screen media (Rideout, 2011). In 2017, Ofcom, a telecommunications company, reported that 95 percent of children ages 8 to 11 spent about 14 hours per week watching television. These findings indicate a large discrepancy between the amount of time spent outdoors and the amount of time spent being inactive and in front of a screen, which raises additional concerns for the health and wellbeing of this generation.

Limited opportunities to participate in outdoor, risky play due to parents’ fear of risk and increased screen time can have significant repercussions on childhood health and development (Be Out There: National Wildlife Federation, 2010; Brussoni et al., 2012; Burdette & Whitaker, 2005; Hinkley, Brown, Carson, & Teychenne, 2018). Now more than ever before, children are failing to engage in the appropriate amount of physical activity, contributing to the increasing

prevalence of childhood obesity in the United States (Skinner et al., 2018). There is also concern for heightened levels of anxiety and depression in today's youth, due to the increased use of media and the lack of less-structured time outdoors (Be Out There: National Wildlife Federation, 2010; Gray, 2011). The CDC has estimated that more than 4.5 million children ages 5 to 17 are diagnosed with attention-deficit hyperactivity disorder, which some attribute to increases in media consumption (Be Out There: National Wildlife Federation, 2010). Research has also shown that lower levels of outdoor play and higher levels of screen time are associated with poorer social skills in children (Hinkley et al., 2018). Along with these consequences, experts on this issue have expressed concern that children will be deficient in their abilities to assess and manage risk now and in the future if they continue to lack experience in risky play. As Malone (2007) argued, "Over protective parents are creating a generation of children who are potentially ill equipped to deal with the everyday risks of living" (p. 513).

Some evidence has shown that risky play interventions improve children's ability to accurately perceive risk scenarios and competently manage risk (Lavrysen et al., 2015). To measure risk perception and risk competence, Lavrysen and colleagues (2015) used alternating images of risky and non-risky situations on a screen. Greater risk competence was indicated when a participant had faster response times in detecting risky situations. Additionally, the researchers administered a questionnaire to teachers and trained observers to measure five factors of risk competence on the playground. While this study showed that risky play interventions can improve risk competence, no research has shown the impact that parents' tolerance of risky play can have on children's abilities to assess risk in a daily task, such as crossing a busy street.

While parents' perceptions of risk may influence children's risk assessment abilities, other factors also may contribute to the children's use of those skills in everyday tasks, such as

safely crossing a street. Some of these factors include age, sex, motor coordination, mother's education level, and parents' country of birth. A multitude of studies have shown that younger children are more at risk for pedestrian-related injuries (Barton & Schwebel, 2007). In regard to sex, it has been consistently reported throughout history and across cultures that boys experience pedestrian injuries more often than girls (Schwebel, Davis, & O'Neal, 2012). With concern for motor coordination, empirical evidence has shown mixed results in the direct relationship between unintentional injury and motor coordination (Schwebel, Binder, Sales, & Plumert, 2003). Researchers (Schwebel, Davis, & O'Neal, 2012) have found that risk for pedestrian injuries is greater in communities with a lower socioeconomic status, which is closely linked to mother's education level. Finally, parents' country of birth may be a factor that predicts children's ability to make safe decisions and prevent injury. Immigrant families tend to live in more impoverished neighborhoods and may face greater risk factors compared to native-born families, which could make them more vulnerable to pedestrian-related injuries (Riedel, 1998; Singh & Siahpush, 2002). However, Schwebel, Brezausek, Ramey, & Ramey (2005) found that non-white children of immigrants had a significantly lower rate of injury.

The present study aimed to understand to what extent parents' tolerance of risky play predicted children's ability to assess risky situations in daily life. We hypothesized that parents' tolerance of risky play predicts children's performance on a virtual street crossing task. Specifically, we hypothesized that a greater tolerance of risky play would predict fewer hits and close calls on a virtual street crossing task performed by children. In addition to parents' tolerance of risky play, we examined other factors that might affect a child's ability to cross the road safely. While pedestrian safety skills are still developing well into adolescence (O'Neal et

al., 2018), we controlled for age in the present study by using a narrow range of 7- to 9-year-olds.

Method

The aim of this correlational, pilot study was to determine if parents' tolerance of risky play is predictive of children's abilities to assess risk in a simulated street crossing task. The methods for this study were approved by the Colorado State University Institutional Review Board, IRB number 19-8560H.

Participants

We recruited typically-developing children and their parents from May 2018 to March 2019 via convenience sampling. In our sample, there were 19 child participants (11 boys and 8 girls) ages 7 to 9 years old ($M = 8$). Out of the 19 parent participants, there were 15 mothers, 1 father, 2 aunts, and 1 uncle. Eight of the parents were in the 26 to 35 age range, 9 parents were in the 36 to 45 age range, and 1 parent was in the 46 to 50 age range. Participants were recruited from the Boys & Girls Club of Larimer County in Colorado, an after-school program at Colorado State University, and personal acquaintances of the researchers. Children were eligible to participate if they spoke English and their consenting parent could understand written English or Spanish. An interpreter facilitated communication between Spanish-speaking parents and English-speaking members of the research team to ensure parents' full comprehension of study procedures. Children were excluded if they had light-sensitive epilepsy or significant difficulty hearing, seeing, or learning as reported by their parents. The participants and their parents received a small monetary compensation for their participation in the study.

Instruments

We administered one questionnaire to parents to assess tolerance of risk in play. We administered the other two measures to the child participants, which included a virtual-reality-based test of street crossing performance and a motor skills assessment.

The Tolerance of Risk in Play Scale-Revised (TRiPS-R) measures the degree to which parents allow their children to participate in risky play (Grady-Dominguez & Bundy, unpublished). TRiPS-R asks parents to indicate whether they ever allow their child to participate in each of 31 risky play activities. TRiPS-R items are based on Sandseter's (2007) six categories of risky play: 1) play at great heights, 2) play at high speed, 3) play with harmful tools, 4) play near dangerous elements, 5) rough-and-tumble play, and 6) play where the children can "disappear"/get lost. Sample items include: "Would you let this child climb a tree within your reach?" and "Do you let this child play in your yard unsupervised?" We converted raw TRiPS-R scores to interval-level Rasch measure scores using Rasch measurement software, Winsteps version 4.4.0 (Linacre, 2010).

TRiPS-R is a revised version of the original TRiPS (Hill & Bundy, 2014). All (100%) of the TRiPS items had goodness-of-fit statistics in the accepted range, providing excellent evidence for construct validity (Hill & Bundy, 2014). Analysis of external validity showed that self-perceived risk tolerance, measured on a visual analogue scale, was highly positively associated with overall scores on the TRiPS. TRiPS scores were also highly correlated with child age. Hill and Bundy (2014) found a person separation index of 2.63, indicating that the TRiPS separated persons into more than 2 groups of tolerance, providing evidence for acceptable internal reliability. The person reliability index for the instrument was 0.87, indicating that the TRiPS consistently differentiated low and high scoring persons. Preliminary examination of

validity and reliability using Rasch analysis suggests TRiPS-R does not differ substantially from TRiPS (Grady-Dominguez & Bundy, unpublished).

Internet-based Virtual Pedestrian Environment. To measure a child's performance on a task simulating actual risk, we used a virtual reality headset programmed with a virtual street crossing task developed by Schwebel, McClure, and Severson (2014). The program functions as an internet-based application on a smartphone, which is positioned on a virtual reality headset for viewing. The user views a simulated pedestrian environment and can turn his or her head left to right to see virtual cars approaching from either direction. The user pushes a button on the headset when he or she makes the judgment that it is safe to cross the street. We evaluated the child's frequency of hits/close calls from virtual cars in accordance with study done by Schwebel, McClure, and Severson (2014). We collected scores from 21 out of 26 trials performed by each child, as the first trial served as a practice trial.

The virtual street crossing measures were shown to have high validity as indicated by moderate correlations with real world streetside measures ($r = .42, .52; p < .01$) (Schwebel, Gaines, & Severson 2008). The instrument has shown to have weak to moderate correlations with other virtual street crossing measures ($r = -.32, r = .56, r = .27, r = .33, p < .01$), which offered some evidence for internal reliability (Schwebel, Gaines, & Severson, 2008).

The Motor Assessment Battery for Children, 2nd edition (M-ABC 2). The MABC-2 (Smits-Engelsman, Fiers, Hendersen, & Hendersen, 2008) was a secondary tool used to measure children's motor performance. The assessment comprises 8 items that measure three major performance areas including manipulative skills, aiming and catching skills, and balance skills. A lower total standard score is indicative of poorer performance. We predicted that children who

had difficulty with motor coordination would be at greatest risk for hits and close calls when crossing the road on the virtual reality program.

Chow and Henderson (2003) found an average intraclass correlation of 0.96, indicating strong interrater reliability for the instrument. Croce, Horvat, and McCarthy (2001) found the total impairment scores on the MABC to be moderately correlated ($r = .53$) with the composite scores on the Bruininks-Oseretsky Test of Motor Proficiency (BOT), providing good evidence for external validity.

Procedure

After we obtained written consent from parents and verbal assent from children, the parents completed a demographic sheet as well as the TRiPS-R survey. Child participants were seen individually for a 1-hour session in a quiet room during the time they were at the Boys & Girls Club or in a quiet classroom on a college campus. The researcher administered the MABC-2 to the child participants. The researcher read aloud the instructions for each task and ensured each participant understood prior to starting the task. Finally, participants performed the simulated street-crossing task using the virtual reality program and headset. All participants completed the virtual reality task in a rotating office chair with arm rests.

Data Analysis

The predictor variables for the study included the TRiPS-R scores, MABC-2 standard scores, age (all continuous variables) and sex, parents' country of birth, and mothers' education level (all dichotomous variables). The criterion variable was frequency of hits and close calls on the virtual reality street-crossing task.

We used IBM SPSS Statistics, version 25.0 (IBM Corp, 2017) to conduct correlations followed by a series of simultaneous linear regressions including all predictor variables. We

initially performed correlation coefficients to determine the strength of the relationships among all variables and examined scatterplots for any data points that cause undue effects on correlations. We excluded 1 data point that had an undue effect on the relationship between parents' tolerance of risky play and hits and close calls. We conducted a simultaneous multiple regression to assess the extent to which all independent variables, together, predicted hits and close calls. We then used correlation coefficients to eliminate non-predictive variables, as well as highly correlated variables that caused an excessive amount of co-variance. Finally, we conducted a multiple linear regression to investigate to what degree parents' tolerance of risky play predicted hits and close calls in the virtual reality task. The data met the assumptions of homogeneity of variance and linearity and the residuals were approximately normally distributed. The VIF in the final regression analysis indicated that there was no evidence of multicollinearity, with all VIF values less than 5.

Results

We conducted a simultaneous linear regression to assess the degree to which the following factors significantly predict hits and close calls on the virtual street-crossing task: sex, age, parents' country of birth, mother's education level, motor skills, and parents' tolerance of risky play. When all variables were forced into the analysis, parents' country of birth was the only significant predictor of hits and close calls on the virtual street-crossing task ($R^2=.304$, $F(1,16)=6.99$, $p<.05$). Parents' country of birth ($\beta=-3.25$, $p<.05$) predicted 30% of the variance for hits and close calls. To supplement these findings, an independent samples t-test revealed that children whose parents were non-immigrants ($M=4.00$, $SD=1.76$) had significantly fewer hits and close calls compared to children whose parents were immigrants ($M=7.25$, $SD=3.37$), $t(10.03)=2.47$, $p<.05$.

Correlation coefficients (see Table 2) revealed a strong relationship between parents' tolerance of risky play and parents' country of birth ($r=.704, p<.01$) and between parents' country of birth and mothers' education and children's MABC-2 scores. Thus, due to the strong correlations among these variables, to answer our primary research question (i.e., to what extent does parents' tolerance of risky play predict children's performance on a virtual street crossing task), we entered only TRiPS scores into a second linear regression. Not surprisingly, given the moderately strong correlation between TRiPS and hits and close calls, the second regression analysis revealed that parents' tolerance of risky play significantly predicted the total number of hits and close calls from virtual cars ($R^2=.29, F(1,16)=6.52, p<.05$). Tolerance of risky play accounted for 29% of the variance for hits and close calls. The beta coefficient ($\beta=-1.57, p<.05$) indicated that for each unit decrease in tolerance of risky play, there was 1.57 unit increase for hits and close calls.

Table 2. Pearson Correlations among Predictor Variables and Hits/Close Calls

	Age	Sex	Country of Birth	Education Level	MABC-2	TRiPS	Hits/Close Calls
1. Age	-						
2. Sex	-.085	-					
3. Parents' Country of Birth	-.095	-.125	-				
4. Mothers' Education Level	-.021	.018	.678**	-			
5. MABC-2 Standard Score	.075	.000	.484*	.487*	-		
6. TRiPS	.036	-.442	.704**	.454	.472*	-	
7. Hits and Close Calls	-.147	-.055	-.551*	-.283	-.458	-.538*	-

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Discussion

The purpose of this study was to investigate to what extent parents' tolerance of risky play predicted children's performance on a simulated street-crossing task. Our results indicated that both parents' tolerance of risky play and parents' country of birth, individually, were predictive of the frequency of hits and close calls from virtual cars. However, these factors were highly correlated. Other factors including age, sex, motor coordination, and mother's education level were not significantly predictive of children's performance on the simulated street-crossing task. These variables were highly correlated with parents' country of birth, which likely explains why they did not add to the prediction once country of birth was entered into the regression.

Parents have a significant influence on their children's play (Niehues, Bundy, Broom & Tranter, 2016) and thus can influence the skills that children learn through play. When parents had a higher tolerance of risky play, this predicted fewer hits and close calls on the virtual reality task, which suggested that these children were more likely to possess the decision-making skills necessary for crossing the street, at least in a virtual situation. Our results support previous research findings (Lavrysen et al., 2015) that children who are given risky play experiences improve their ability to perceive and competently manage risk (Lavrysen et al., 2015). The findings from our study also partially support Sandseter and Kennair's (2011) theory that through repeated natural and progressive exposure to fear-inducing stimuli in risky play, children overcome fears and master age-adequate challenges.

While parents' tolerance of risky play predicted children's performance on the simulated street-crossing task, parents' country of birth was in fact the best predictor. Those findings are likely to be the result of the strong relationship between parents' country of birth and parents' tolerance of risky play. Our results contrast those of Schwebel and colleagues (2005), which

found that Hispanic and Asian-American child immigrants are less at risk for unintentional injuries compared to children who were born in the United States. However, our results provided more insight into the influence of parents on children's decision-making when dealing with risks. One possible explanation is that many immigrants experience difficult living circumstances and take many personal, financial, and social risks to move to a foreign country. These circumstances may lead them to become relatively risk-adverse with regard to their children's play, especially for parents who may be undocumented. With less opportunities to experience risk through play, children with immigrant parents are more likely to have poorer performance in pedestrian safety. It could be that this population relies on parental supervision to prevent injury (Schwebel, Brezausk, Ramey, & Ramey, 2005), and when left to their own devices, children have not learned how to adequately manage risks.

While mother's education level was not a significant predictor for hits and close calls, it was moderately correlated with parents' country of birth. This finding may suggest that parents who emigrated from Mexico were more likely to have a lower socioeconomic status. Previous researchers have found that children living in lower socioeconomic conditions are at greater risk for mortality and morbidity in traffic-related injuries, including pedestrian injuries (Laflamme & Diderichsen, 2000). Living with a lower socioeconomic status may partially explain why children with immigrant parents in this study were more likely to score poorly on the simulated street-crossing task.

Other factors including age, sex, and motor coordination were not significant predictors of hits and close calls from virtual cars. However, motor coordination was moderately correlated with both parents' country of birth and parents' tolerance of risky play. Motor coordination may partially explain why children whose parents had a greater tolerance of risky play performed

better on the virtual reality task. This adds to the research which has found mixed results for the relationship between motor coordination and unintentional injuries in children (Schwebel, Binder, Sales, & Plumert, 2003).

Limitations

While this pilot study produced statistically significant findings, it is important to consider the limitations. Most importantly, we had a small sample from one community in the United States, which most certainly does not represent all 7- to 9-year-olds in the U.S. Future researchers should aim to include a larger sample size that is representative of the population and acceptable for more in depth statistical analysis. Another limitation is that we had more mothers than fathers in the study. Previous findings indicate that fathers are typically more permissive of risky play compared to mothers (Creighton, Brussoni, Oliffe, & Olsen, 2017; Niehues, Bundy, Broom, & Tranter, 2016). Therefore, future researchers should investigate fathers' tolerance of risky play.

It is important to consider that using the virtual reality tool to measure children's ability to assess risk may not be indicative of children's actual street crossing ability. Nevertheless, the simulation provided a safe and controlled environment for child participants and has shown to be comparable to real-world street side measures (Schwebel, McClure, & Severson, 2014).

Implications

Occupational therapists have a unique role in that we can intervene in children's task performance and physical and social contexts to promote optimal child development (Case-Smith, 2014). Occupational therapists also recognize play as an important occupation for children, which helps them learn and develop new skills within their surrounding environments (Bundy, 1993). There is concern from the present study and other studies (Jenkins, 2006;

Malone, 2007) that children are not experiencing risk in play, and therefore are ill-equipped to deal with the risks of everyday living. Our findings suggest that occupational therapists can educate parents and caregivers about the importance of risky play in that it can help their children competently manage the risks of daily activities, such as crossing the street. Risk-reframing workshops for parents have the potential to be an influential way to change parents' perspectives and promote health risk-taking in children (Brussoni et al., 2018).

Considering the bigger picture, perhaps more needs to be done when facing public policies focused on immigration and free-range parenting. Immigrants coming to America appear to be greatly aware of risks because many of them give all that they have to build a better life in the United States. Perhaps immigrants are even more fearful of risks for their children, and as a result, do not allow their children to engage in risky outdoor experiences. Future research should use qualitative means to explore how immigrants experience risk in their children's lives and why they may be more likely to safeguard their children when facing these risks.

Future researchers should examine the influence that children's temperament may have on children's ability to cross the street. Research has shown that children who lack the capacity to plan and inhibit inappropriate responses under new, uncertain, or directed circumstances are more prone to unintentional injuries (Schwebel, 2004). Other variables that may be considered for future research include experience with video games and virtual reality, the presence of older siblings, and parenting assistance for learning to cross the road.

Conclusion

Children in today's society are often limited from engaging in risky, outdoor play, which can have significant ramifications on their health and development (Brussoni et al., 2015). Due to the heightened fear of risk, many parents and caregivers seem to contribute unwittingly to

potentially negative outcomes (Niehues, Bundy, Broom, & Tranter, 2013). Our study aimed to determine the extent to which parents' tolerance of risky play predicts children's ability to assess risky situations, such as crossing a street albeit in a virtual environment. Along with parents' permissiveness of risky play experiences, parents' country of birth was also a significant predictor of children's performance on a virtual street-crossing task. In other words, children whose parents have low tolerance of risky play or whose parents were born outside of the United States may have greater difficulty assessing and managing risky situations. While further research is needed to support these results, this study was instrumental in investigating the influence parents have on children's risk assessment skills. Most importantly, this is the only study that has shown the positive effects that can occur when parents give their children sufficient opportunities to engage in risky play. Occupational therapists can use these findings to provide risky play opportunities through parent education to enhance children's abilities to assess risk and reduce the chance of pedestrian-related injuries.

CHAPTER 4: REFLECTIONS AND CONCLUSIONS

As an occupational therapy master's student, this project was largely supplemental to my coursework and will help me as I continue on with my career. Throughout this process, I learned that a multitude of factors can determine children's development of risk assessment skills. Most notably from our findings, parents' tolerance of risky play can have a significant impact on children's abilities to assess risk and demonstrate safe pedestrian behavior. While it is likely that age would have an effect on these skills (Barton & Schwebel, 2007), we controlled for this variable by using a narrow age range.

With parents' tolerance of risky play and parents' country of birth as significant predictors of performance on the simulated street-crossing task, our findings support the notion that children are products of their social environments (Vygotsky, 1978). Accordingly, this project has greatly expanded my understanding of risk within social contexts. Children whose parents have a higher tolerance of risky play may make better decisions when crossing the street. However, we must consider that parents live within a larger societal context where they are heavily influenced by perceptions of others (Lupton, 1999). These perceptions may be exhibited through parents' country of origin, popular media sources, and public policies. Risk-reframing seems to be a logical need given the results of the present study; however, it is steep task to undertake as the fear of risk appears to have deeper cultural and societal roots (Beck, 1992). The hope is that we have the power to minimize these effects by educating ourselves and others through research and practice.

While this project produced significant findings, there are a few things I would have done differently to enhance the project. One major limitation of the study was our small sample size.

We tried unsuccessfully to recruit participants through community agencies and university programs. This was somewhat surprising as we offered monetary compensation for participation.

Future Research

Future researchers should examine other factors that may predict children's abilities to assess risk. Previous researchers have shown that temperament can be a factor for unintentional injuries, especially for children who have difficulty with inhibitory control (Schwebel, 2004). To consider temperament, we asked the question, "How much of a risk-taker is this child?" using the following Likert scale: 1) not at all, 2) somewhat, 3) pretty much, and 4) very much. However, when we included the answers to this question in data analysis, it was not a significant predictor of hits and close calls on the virtual reality task, likely because there was little variability in parents' responses. Most parents scored their child a 2 or 3 on a 4-point scale. Future researchers should consider using an instrument with greater variability and one that could more directly target temperament. Future researchers should also investigate how non-typically developing children perform in the virtual pedestrian environment, and if parents' tolerance of risky play continues to serve as a significant predictor of hits and close calls for this population.

Future researchers could also explore children's reports of what they are allowed to engage in and compare these scores to parents' tolerance of risky play. The present study initially included children's reports as a measure. However, we excluded this measure from the analyses because children's responses differed widely from their parents' and the findings were beyond the scope of the research question. Future researchers should aim to further develop this instrument and perhaps consider asking the question to children, "What risky play activities do you engage in?" rather than, "What risky play activities are you allowed to engage in?"

Personal Reflections

I am beyond grateful to have studied for my master's degree in occupational therapy at Colorado State University and for the opportunity to further develop my skills as a researcher. As I continue my career as a pediatric occupational therapist, I hope to apply what I have learned from this project to my practice. I will encounter parents from diverse backgrounds who will vary in the amount of risk that they tolerate in children's play. By knowing that the lack of risky play can lead to negative consequences, I need to be able to educate parents about the benefits of risky play while also being client-centered and culturally sensitive. I also hope to reframe risk for other therapists and professionals in order to promote age-appropriate risk-taking in children.

Finally, I plan to take not only the findings, but the life lessons that I learned along the way. This process did not come easy and there were occasional bumps in the road that seemed impossible to overcome. Now as I reflect on this experience, those minor defeats helped me become more resilient and made me even more determined to reach my goal. This experience taught me to accept myself as a life-long learner, where I am not expected to know all of the answers. I just need to know where I can find them and not be afraid to take healthy amounts of risk.

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