

Dangerous or Safe? Changing Caregiver Perceptions and Engagement with the Sonoran

Desert

by

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ABSTRACT

The Sonoran Desert is a magical place full of beauty and wonder. With an increase each year in the number of new families calling Arizona their home, so also comes an increase in pre-conceived notions of the dangers of the Sonoran Desert. Dangers such as plants, animals, and weather conditions can cause fears in families. Though these fears are valid, understanding different ways to stay safe and engage with nature in the Sonoran Desert is critical to building future generations of adults that value the natural world. Current literature does not address the Sonoran Desert and Arizona as a space to engage in nature play. The current action research study builds on the literature to offer new perspectives on nature play in the Sonoran Desert. A mixed-methods approach was used to assess caregivers' perception of safety, risk, and benefits of nature play in the Sonoran Desert. The intervention utilized the social media platform, Instagram, to administer the intervention content. Results from this study suggest that even though participants were already engaged in nature play, their perceptions of risk, safety, and benefits of nature play in the Sonoran Desert changed positively or were reinforced. The analysis expands the current literature on risk, safety, and benefits of nature play.

Key words:

action research, social media, nature play, safety, fear, sonoran desert

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CHAPTER 1

LOCAL AND LARGER CONTEXT

Definition of Terms

As scholars discuss topics of nature, environment, outside, and outdoors, some terms are used interchangeably, yet there is a distinction between them. The terms nature, natural environment, environment, outside, and outdoors can be synonymous. This study defines nature as the physical world that includes all flora, fauna, and landforms. The natural environment is everything on earth that is biotic and abiotic. It does not include anything artificial or human-made. The environment is the physical geographical space all living things are in at a particular time. Outside will be defined as the geographical space beyond a physical structure like a home or apartment.

Similarly, the outdoors is a geographical space beyond a physical structure but far away from human domiciles. Topics on nature, environment, outside, and outdoors will be discussed throughout the study. It is essential to set out the definitions of the terms beforehand to situate the literature and the current study.

Defining Nature-Urban vs Nature-Wild

A dichotomy throughout this paper is the relationship between nature in urban centers and nature outside urban centers, coined as nature-wild. Nature is in every part of the world. Walking out the door of a residence might not be considered a way to connect with nature (Aaron & Witt, 2011). However, when one walks down the street, one may experience a myriad of forms of nature such as birds chirping, dogs barking, wind, leaves or trees rustling, and bugs and insects hiding from the light or looking for food. In urban centers, all of these experiences are possible. In the nature-wild setting, there will be

significantly fewer human creations like buildings, telephone poles, and cars. In the nature-wild location, one might find other humans enjoying nature, but one is more likely to encounter the wonders of nature in the leaves, bushes, plants, animals, and insects all around. These exist in this space as though humans are not even there (Rolston, 2001). This study focuses on the perceptions of caregivers' interactions with nature in whatever setting they are in. No one space is held in higher regard than the other. Knowing how perceptions of nature are shaped by interactions with popular media and social media is essential to finding new ways to connect others to nature, whether in the nature-urban or the nature-wild setting.

Defining Ecopsychology

Ecopsychology bridges two discourses, psychology and environmentalism, while highlighting the relationships between nature and those that live within its boundaries (Davidson, 2021). Themes will arise on how humans think and perceive nature and their interactions with it. Early ecopsychology scholar Theodore Roszak provides eight principles for considering ecopsychology as a discipline. The eight principles focus on how humans unconsciously think about their environment and their place in it, while trying to expose the interconnectedness between the two (Roszak, 1992). Later scholars proposed five ecopsychology principles, as the eight provided by Roszak were intended to be guidelines for developing one's own eco-psychological awareness (Hibbard, 2003). These five new principles condensed the eight original principles to recognize the earth as a living system, with humans as a part of the living system. The system requires nurturing relationships and must recognize the interconnectedness between humans and the earth, as the human psyche and ecological unconscious are inherent aspects of

humans' connection to earth (Hibbard, 2003). Recognizing the interconnectedness of the earth and its environments is essential for humans. It allows for deep and meaningful relationships and connections to the natural world.

Defining Characteristics of Caregivers, Parents, Teachers, and Other Educators

The term “caregiver” rather than “parent” was selected intentionally. Despite the interchangeable nature of these two terms, there is a difference between them. Caregivers are trusted adults that engage with children in play activities. A caregiver can be a father, mother, brother, sister, uncle, aunt, grandmother, grandfather, or nanny (Bromer & Henley, 2004). The one commonality in these adult roles is fostering the connection between the child and nature. Parents not only serve as caregivers for their children but they are also typically more involved in managing the child’s daily schedule and making decisions about the child's life, in comparison to other caregivers. Parents are usually the authority, disciplinarians, and decision-makers (Gadsden et al., 2016). Parents are likely concerned with numerous facets of a child’s life such as their schedule, decisions on what the child should eat, playtime, and if they should or should not do something (Ginsburg, 2007). Ma and colleagues (2015) reviewed the relationship between the learning outcomes of children and the educational involvement of parents. The study indicated there is a strong relationship between parental involvement and children’s learning outcomes (Ma et al., 2015). Ma and colleagues (2015) concluded that parents have a positive impact on children’s learning when they are actively involved and engaged in the learning process. The current study uses the term “caregiver” to be inclusive of anyone who is bolstering the connection between the children they care for and nature.

Understanding the role of parents, teachers, and other types of educators that are taking on the role of caregiver is essential to understanding the relationships between children and nature. Teachers have different roles when it comes to connecting children to nature. Teachers and other educators are specially trained to create a space for children to learn. Largo-Wight and colleagues (2018) studied an elementary school in the southeastern United States to apply an outdoor classroom approach for the students. In the outdoor classroom, teachers spent less time redirecting child behaviors which resulted in children who were more on task compared to the control group of an indoor classroom. (Largo-Wight et al., 2018). Teachers can have a bigger impact on students' learning outcomes by changing the type of learning setting. An outdoor classroom supports the teachers' role in creating an effective learning environment. Martinsone and colleagues (2022) studied the perceptions of teachers and parents regarding the child's social and emotional skills. In general, parents and teachers reported similarly on the child's behaviors, although they reported the child's social and emotional competencies differently. The discrepancies indicate that the different roles, teacher or parent, serve different functions when it comes to children's learning outcomes (Martinsone et al., 2018). Parents and teachers have different roles related to children's learning, but each role is essential to the learning outcomes. The current study seeks to connect with caregivers because they provide the child with autonomy to make decisions about their play experiences in nature.

Parents and Caregivers and Play

Caregivers create opportunities for play with their children, yet caregivers might shy away from children's play time or unstructured play time due to schedules, work, and

other life responsibilities (Rosenfeld, 2010). However, there are numerous benefits to children's play. Play allows children to develop a sense of their environment (Summers et al., 2019). Through play, children explore the relationships between themselves and others in a safe way (Gordon-Biddle et al., 2014). Playtime allows children to express their curiosity and engage in creative cognitive processes related to the imagination (Tsai, 2012). Physical movement is an inherent part of playtime and fosters healthier children (Houser et al., 2016). Some parents or caregivers might not see play as learning, but when children engage in play, it stimulates learning. When playing, children learn competence, curiosity, creativity, and connectedness, and they also develop resilience (Ernst & Burcak, 2019). One of the simplest ways to engage children in play is to allow them the space and opportunity to create a game or activity. Allowing children to be creative provides them agency over themselves, while taking the pressure off caregivers to create something (Baker et al., 2021). Caregivers should engage their children in unstructured or semi-structured play (Gulliksen, 2018). Play is a powerful learning tool that makes a positive impact on children participating in it. Caregivers who facilitate a play-friendly environment are instrumental in fostering the success of children.

Defining Positive Communication and Positive Parenting

Positive communication is relatively young as a discourse. Margaret Pitts and Thomas Socha organized the first collected works devoted to this topic in 2012 (Ahmed, 2020). The strategy of positive communication was in practice before it rose to a discipline within the interpersonal communication canon (Ahmed, 2020). In interpersonal communication, there are multiple styles to connect with and build relationships with others, which can have either positive or negative effects depending on the style

employed. According to Leontovich (2014), positive communication encompasses acceptance, affirmation, and constructive support, fostering optimistic development and effective interactions with others. Pitts & Socha (2013) define positive communication as a means of fostering positive emotions in people, promoting healthy behaviors and motivating them to live fulfilling lives in alignment with their personal journeys. White (2019) discusses the benefits of using positive communication in education to create more sustainable happiness within school systems. According to Kosar and colleagues (2020), schools that implemented positive communication, fostered teamwork, and promoted job satisfaction, led to improved performance indicators. Rogers and colleagues (2009) suggest that more positive communication between parents and children could lead to greater reported positive self-concept, which leads to academic achievement. Utilizing positive communication can create an environment that will support learning outcomes. Adults utilizing different communication styles can impact children's ability to learn.

Parents' communication styles have a significant impact on children's ability to learn and achieve learning outcomes. Miao's (2021) research on parent and child education and learning outcomes revealed a strong relationship between parents that utilized a proactive communication approach, indicating that more communication between parents and children can support better learning outcomes. Scholars suggest that there is a positive link between the quality and quantity of parent and child communication, and it leads to a greater impact on the child's development of language skills and cognitive development. (Hirsh-Pasek et al., 2015; Romeo et al., 2018; Sohr-Preston et al., 2012; Dickson, Hess, Miyake & Azuma, 1979; Dunn, Brown, Slomkowski,

Tesla, & Youngblade, 1991; Ensor & Hughes, 2008; Slomkowski & Dunn, 1996; Zhang, 2020). These foundational development skills will directly impact a child's ability to achieve higher learning outcomes, compared to parents who use other communication styles. Utilizing different communication styles along with understanding different caregiver and child relationships expands the understanding of methods employed in children's learning.

Positive parenting refers to the practice of engaging children using positive interactions even when children display poor or bad behavior. Positive parenting, which traces its origins to the positive Adlerian psychology and positive discipline theories developed by Alfred Adler and Rudolf Dreikus in the early 1900s to 1920s (Holder, 2016), was further expanded on by Lynn Lott and Jane Nelson in the 1980s (Nelson, 1979; Carol & Hamilton, 2016). The practices for positive discipline parenting and classroom management are still in use today (Nelson et al., 2013). Positive parenting refers to a compendium of roles that caregivers hold with their children. Understanding positive parenting's origin and the different roles adults have in children's lives foster a deeper understanding of the impact adults have on children.

The roles and relationships adults create with children are complex, as there are numerous types of relationships that could unfold. Mihalec-Adkins (2020) defines the term "parent-child" as a unique and significant relationship between parents and their offspring, or an individual and a child that has been legally adopted, characterized by special interactions. Scholars use the term "parent-child" as a way to reference parenting due to the different types of parenting strategies and complex relationships between parents or caregivers and the child, parental support, and parental control (Kuppens &

Ceulemans, 2018). There are several parenting strategies, and parenting has been defined by O'Connor and Scott (2007) as the means by which parents shape their children's development through cause, context, and convertibility. Positive parenting can lead to a children's academic success and psychological well-being (Joussemet et al., 2008; Hasan & Power, 2002; Smith et al., 2000; Sandler et al., 2015; Knox et al., 2013; Roggman et al., 2008). Positive parenting involves guiding, leading, teaching, caring, empowering, nurturing, being sensitive to the child's needs, maintaining non-violence, fostering regular open communication, showing affection, providing emotional security, respecting the child's developmental stages, setting boundaries, empathizing with children's feelings, and supporting the child's best interests (Rodrigo et al., 2012, p. 4). Positive parenting has numerous beneficial outcomes for the child and supports the relationships between child and caregiver. Along with the different types of parenting relationships with children, understanding the different ways parents communicate with their children furthers the understanding of the complex relationship between caregiver and child.

Larger Context:

The way humans have engaged and thought about nature is in constant fluctuation. Community, culture, and connection to nature define the relationship between humans and the natural world. Each community or culture has a different relationship with nature. In particular, children's connection to nature is formulated through their own community connections to the natural world (Bang, 2015). Tim Ingold highlights these ideas in *The Perception of the Environment*, where he illustrates motherhood in animals, plants, and human relations. The relationships created between nature and humans are situated within the community of relationships between all living things (Ingold, 2000). The

relationships between humans and nature give rise to the importance of developing connections between humans and the natural world. Merino and colleagues (2020) examined 967 students' character strengths, interpersonal strengths, emotional strengths, strengths of restraint, spiritual strengths, and intellectual strengths. Merino and Colleagues (2020) demonstrated a strong correlation between appreciation of beauty in nature and pro-environmental behavior, highlighting the connectedness between humans and nature. Raymond and colleagues (2013) analyze metaphors to describe the relationships between humans and the natural environment in different geographic contexts. The metaphors of economic production, closed-loop production, stewardship, web of life, and eco-cultural community provide distinct frameworks for understanding the relationship between humans and nature (Raymond et al., 2013, p. 540). Humans and nature have interacted since the arrival of early hominids on Earth. As time has progressed, the relationships between humans and nature have changed. Gaining an understanding of the way humans form relationships with nature and considering one's cultural connections to it are essential factors to fostering nature play within all communities.

Relationships and Connection to Nature

Nature relationships and nature connections can be used interchangeably. However, the way humans create relationships and connections could be considered different. In this paper, nature relationships will be defined as the metaphysical manifestation of interactions with nature over a lifetime (Seymour, 2016), while nature connections are the attribution of attitudes and beliefs towards nature at a particular moment in time (Ives et al., 2017). Metaphysical manifestations of nature relationships

involve the development of self through their prolonged experiences in nature, while nature connections are the singular moments of interaction with nature that build to nature relationships. Nature relationships and nature connections tend to be central to the human experience.

Scholars and professionals in the environmental education discipline use relationships with nature and connection to nature similarly. Tam (2013a) elaborated on the notion of connection to nature through the biophilia hypothesis, where humans are predisposed to be attracted to nature and to depend on nature; however, in recent years, humans have become so dependent on urban life the relationship to nature is disintegrating. Tam (2013a) continues by identifying a connection to nature through ecopsychology, where one way to rebuild the connection to nature between humans and nature is to expand human identity through connections with nature. Zelenski and Nisbet (2012) contribute to the definition of connection to nature and relationships with nature through nature relatedness. Nature relatedness refers to the variation in cognitive, affective, and experiential connections that humans have with nature. It can be used to predict attitudes and behaviors based on these two factors (Zelenski & Nisbet, 2012). Connections with nature are attitudes and behaviors that humans have with the natural world at a particular time (Rosa & Collado, 2019) while relationships with nature are the metaphysical manifestations of those connections, attitudes, and behaviors with the environment over a prolonged period of time (Egri, 1997). Metaphysical manifestation of nature connections, attitudes, and behaviors is not limited to feeling fear or joy in nature, but also includes the development of self-understanding through repeated experiences in nature that take a lifetime to cultivate (Alcamo et al., 2003; Flint et al., 2013). It is clear

that a deeper understanding of human and nature interactions develops through understanding nature relationships and nature connections. On the other hand, if there is a lack of nature in one's life, there could be unforeseen consequences. The next section will explore these potential negative consequences.

Nature Deficit Disorder

Along with understanding the connections between humans and nature, it is equally important to understand how *not* connecting to nature can impact adults and children. Richard Louv popularized the notion of nature deficit disorder (Louv, 2005). Nature deficit disorder (NDD) is the notion that human beings, especially children, are spending less time in nature compared to past generations; this lack of nature connection is causing behavior problems and other concerns with physical and mental development in children (Louv, 2005). Since the popularization of the term, scholars have studied the impact of human's (particularly children's) reduced time in nature. This has resulted in a deeper understanding of how such deprivation may be a potential reason for the decreased ability of the senses, increased attention challenges, increased obesity rates, and heightened diagnoses of emotional and physical illness (Jimenez et al., 2021). Understanding how humans, and especially children, interact (or do not interact) with nature is essential to creating environments where educational experience with nature fosters a deeper connection with it. Children need to have the autonomy and ability to choose how they interact with the world. Providing a wide array of nature-based experiences can create a greater connection between children and nature, while also alleviating issues created by a lack of time in nature (Kuo et al., 2019). NDD is one way

of looking at relationships between children and nature in different types of settings. Nature connections for adults and children could lead to positive outcomes.

Nature Safe

Life is full of risks, and humans are constantly weighing those risks. Some things are deemed too risky, meaning the benefit does not outweigh the harm it could cause; therefore, these risky acts are avoided. In nature there are many plants, insects, animals, and activities that could be considered too risky. However, research shows that merely being in nature or even seeing scenes of nature provides a reduction in anger, fear, and stress while increasing pleasant feelings (Berto, 2014). Time in nature improves well-being; being in nature or seeing scenes of nature can reduce blood pressure, heart rate, muscle tension, and the production of stress hormones (Jo et al., 2019). Spending time in nature supports the healthy development of children and adults. Even with risks, there are compelling reasons why one should spend time in nature. There are strategies to reduce risk in order to stay safe.

The connection between nature and children is essential to developing healthy developmental functions. Strife and Downey (2009) examined several studies that highlight how green spaces promote social interactions among both youth and adults, leading to enhanced social trust and increased perceptions of community safety. Natural spaces are integral to healthy developmental functions for adults and children, even if there are risks associated with those spaces. There are risks associated with any kind of outdoor play. Understanding the way children can safely interact with nature in Arizona is essential to continue developing the human-nature relationship.

There are numerous ways to stay safe and engage with nature. One widely-accepted plan stems from the Leave No Trace program (Settina et al., 2020). Leave No Trace promotes seven principles to safely engage with nature. The seven principles are: to plan ahead and prepare, travel and camp on durable surfaces, dispose of waste properly, leave what you find, minimize campfires, respect wildlife, and be considerate of others (The 7 Principles, n.d.). By following these principles, families can stay safe and engage with nature. Other entities like national, state, county, and city parks, along with U.S. Forest Service, provide safety tips when engaging in natural spaces (Watson, n.d.; Arizona State Parks, n.d.; Maricopa County Parks, n.d.; City of Phoenix, n.d.). Many of these tips center around the seven Leave No Trace principles, but other safety tips are more practical and often start before ever entering nature. The U.S. Forest Service says to travel with a companion, be in good physical condition, think about where one walks and what one is walking on, wear appropriate clothing, assess the gear that is required, be mindful of the weather, learn basic first aid, camp before dark, be alert on slippery areas, avoid cliffs and alcohol, and be mindful of the water consumed from natural sources (U.S. Forest Service, n.d.). Organizations provide safety tips to ensure that guests have a positive experience, get home safely, and enjoy nature.

Practicing safety principles in nature does not eliminate all risks or injuries. It is challenging to find local-level injury rates for natural and human-made spaces for minors since not all injuries are reported. Data on injury statistics from playgrounds can be accessed from various sources such as the Centers for Disease Control and Prevention (CDC) and Consumer Product Safety Commission. The CDC presents data for the public to utilize. One of the reports from this database is “Leading Causes of Nonfatal Injury

Reports.” The data gathered is in aggregate form for the whole country. The leading causes of nonfatal emergency department visits for both boys and girls for 2020 were unintentional falls, accidentally being struck, a cut/pierce, cycling, and others (National Center for Injury Prevention and Control; CDC, 2020). In 2020, falls were the number one nonfatal reason children between the ages of 6-12 enter the emergency room. To contextualize the nonfatal injuries that occur in different play spaces, data from the CDC and the U.S. Consumer Product Safety Commission illuminates the inherent risks of certain play spaces.

While the category of falls does not indicate where they were sustained, comparing reports on playground statistics is necessary to derive a comparison between playground falls and other areas where falls occur, such as the home or from trees. The CDC states that in the 2001 there were 1,044,891 cases of unintentional falls (National Center for Injury Prevention and Control; CDC, 2001), and the U.S. Consumer Product Safety Commission for 2001 (Tinsworth, 2001) reported that 79% of the injuries occurred on playground equipment. This statistic shows about 825,464 playground falls that required medical attention, whereas other areas had 219,427 cases that required medical attention. From the data, it can be concluded that playground equipment, whether at public playgrounds or at home playgrounds, is not as safe as it should be. Contextualizing playground injuries further will illustrate the types of injuries that are sustained.

As the statistics are in aggregate form and do not delineate the location (playground, home, natural area, etc.), looking at research across the United States is required to develop a full picture of injury rates. There are some studies that provide

injury rate statistics for serious injuries during children's playground activities. Phelan and colleagues (2001) conclude that playground injuries have not significantly declined during their study period between 1992 and 1997, and those playground injuries were more severe than other common unintentional causes. Nauta and colleagues (2014) reported that most safety efforts for children's physical activity have focused on sports, but the results of the study suggest the need to further explore safety measures for unorganized leisure time activities and ways to support safety in those spaces. Blanchard and colleagues (2020) concluded that even with enhanced playground safety standards, between 2006 and 2016 extremity fractures due to playground equipment remained stable, indicating that children were still being injured at similar rates throughout the study period and were the most common type of injury due to playground equipment. An Australian study by Spinks and colleagues (2006) reviewed injury rates for children during outdoor physical activities. While the study reported minor injuries such as abrasions, contusions, and cuts, the study also reported more serious injuries including fractures, concussions, and dislocated limbs (Spinks et al., 2006). Nature play might produce more minor injuries, but playgrounds produce more serious injuries. Despite having safer playground equipment, these spaces are a leading cause of children's visits to emergency rooms.

Organizational Support for Children connecting to Nature

WeConservePA is a state organization that reports on how children can engage in nature play and focus on principles of conservation. Through connecting children to nature in their early years, children are more likely to conserve their environment for future generations to enjoy (WeConservePA, n.d.). Finch and Loza (2015) note open-

ended opinion polls report a majority of Americans want more parks and green spaces, suggesting that they have the desire to get themselves and their families outside. Other scholars have studied the benefits of green spaces for children and determined green spaces support social interaction, decrease crime levels, and increase pro-environmental behaviors (Kuo et al., 1998; Raffan, 2000; Chawla, 2006a). Connections to nature are essential for children to enjoy and spend time with nature. Unstructured nature play that occurs in parks and green spaces is important for a child's well-being. Finch and Loza (2015) suggest that nature play engages children's imaginations, physical endurance, and coordination; tests initiative and courage; builds people skills; and creates a connection to people and nature (p. 5). The benefits of unstructured nature play are essential to children's development. Finch and Loza (2015) continue to suggest that urbanization, parental fears, liability worries, overscheduled kids, and plugged-in play all lead to a decrease in children spending time outdoors and engaging in unstructured play. The lack of time spent outdoors could lead to children that are less physically active and lack developmentally-appropriate social and emotional skills (Scott et al., 2022). State-level organizations support children engaging in nature play and recognize there are limitations to children's time. Recognizing the importance of nature play and its benefits are supported by national organizations as well.

Growing up today looks very different than it did 30 or even 20 years ago. Caregivers are grappling with sensory overload and are easily swayed to allow their children to engage with screens instead of outdoor nature play (Mart, 2021; Hinkley et al., 2018). The National Wildlife Federation produced a call to action through the Outdoor Alliance for Kids that would impact policies and create community connections

to get kids outside (National Wildlife Federation, n.d). The Outdoor Alliance for Kids works with national, state, and local leaders to advance public policy, increase awareness, engage children in movement, and help families to connect in outdoor spaces. (National Wildlife Federation, n.d., pg. 2). Organizations like the National Wildlife Federation are integral to continually advancing best practices in connecting adults and children to nature. Rose and colleagues (2018) propose that community organizations can act as intermediaries between policy and scientific research by utilizing persuasive narratives, effective communication, and robust scientific evidence. These efforts can help bridge the gap and encourage policy makers to support policy changes. Recognizing the influence of nature on children is essential to facilitating caregivers' access to the resources needed to appreciate the benefits of nature play. Scholars like Bartosh (2003) and Ernst and Monroe (2004) concluded that children who spend time outside perform better on academic and ability tests and performances. The benefits of nature play extend beyond the classroom. Scholars suggest that children who engage in nature play are generally more focused and socially connected than children that do not engage in regular nature play (Bento & Dias, 2017, p. 158). Playing outdoors is essential for children's social skill development, as it provides opportunities that may be challenging to develop in indoor settings. Additionally, outdoor play allows children an opportunity to express themselves and release pent-up energy accumulated while being indoors. Depending on perceptions of nature play, some caregivers or organizations may see too many risks and avoid the practice.

Perceptions of nature play impact children's ability to connect with nature. If caregivers' perceptions of risk for their children during nature play are too high, then

caregivers could be less likely to allow their children to engage in it. Prasad and colleagues (2022) noted caregivers who thought there was more risk in outdoor play were more likely to be disinterested in spending time outdoors. There is a general feeling from caregivers that nature play can be dangerous, but caregivers also see the importance of nature play for their children (Bento & Dias, 2017). More research is needed on why caregivers have an aversion to their children playing in natural spaces. This understanding is necessary to help caregivers feel confident in their children's ability to engage in nature play. Providing information on the risks and benefits of nature play is anticipated to encourage caregivers to have positive perceptions of nature play, thus leading them to allow their children outside more frequently.

Local Context

The population of Arizona is on the rise due to the availability of affordable housing and job opportunities (Hing, 2021); however, many families may not be aware of the benefits of nature play or how to ensure their children can safely enjoy playing in the Sonoran Desert. *Raising Arizona Kids* published an article in 2019 to encourage caregivers to get their children outside and engage with nature play. Because of this article, local communities are recognizing that caregivers could be unaware of the benefits of being outside and having safe spaces in the Sonoran Desert to do so. In addition to this urban growth, there is continued concern about children's health and limited mobility (Moore & Cooper, 2014). With today's children spending more time indoors compared to previous generations, they may lack the necessary skills to navigate the complexities of the world, such as learning, evaluating and interacting with risk, and building connections to communities and nature. Moore and Cooper (2014) issued a call

to action advocating for the inclusion of more nature play experiences for children. This aimed to increase their physical activity time and develop spaces that would benefit future generations through positive nature play experiences. Calls to action can only go so far in connecting children to nature play, but recognizing that more caregivers should support the practice is a step toward building those engagements. Recognizing the impact of nature play for families in Arizona is important to building greater connections to nature.

Families that come to make a home in Arizona often struggle with the five issues of connecting children to nature that were suggested by Finch and Loza (2015): urbanization, parental fears, liability worries, over-scheduled childhoods, and plugged-in play (p. 5-6). Parental fears, liability worries, and plugged-in play are focal points of the research project and will be captured in the research instruments. Urbanization and over-scheduled childhoods are important for understanding the reasons why children are spending less time outside but are outside the purview of this research. The study was primarily focused on safety issues like caregiver fears, liabilities, and how children spend their playtime. Urbanization and over-schedule childhoods are external forces that are imposed on children. These issues directly impact the way children engage with nature. Having access to natural spaces like city mountain parks, county natural parks, and other unstructured natural spaces for children to connect with nature is essential to the healthy development of children. There are numerous benefits to engaging in nature play that exceeds the perceived risk, and Arizona needs more programs that connect caregivers and their children to nature. Nature and play can be central to children's lives, especially in

Arizona but caregivers need information to safely support getting their children out into nature in the Sonoran Desert.

Cycles of Research

Before the current cycle of action research study, there were two earlier cycles of research to understand caregiver perceptions of risky nature play in the Sonoran Desert. During the initial cycle, the planning phase was designed to build an understanding of the education staff's perspective of why caregivers were unfamiliar with or unsure of how to safely connect their children to nature. During the active phase of the study, three interviews were conducted with two early childhood teachers and the Director of Education at Desert Botanical Garden. Those interviewed believed caregivers wanted to get their kids outside for nature play activities, but they were either uncertain of how to engage with nature or they expressed concerns about the risks of outdoor play in natural environments that may not be as groomed as playgrounds or classes at Desert Botanical Garden. The thematic analysis of the interviews revealed a deeper understanding of Desert Botanical Garden staff's perspectives of the participants in the nature play education programs. Caregivers are looking for practical ways to safely connect their children with nature. Reflecting on the initial cycle led to the next cycle which was to connect with past Desert Botanical Garden program participants to develop an understanding of their perspective.

In the second cycle of research, caregivers participating in Desert Botanical Garden early childhood programs, camps, and other classes were surveyed on their beliefs and perceptions of risky nature play in the Sonoran Desert. The plan of action conducted pre- and post-intervention surveys, provided an intervention of infographics,

and then conducted several interviews. Two infographics were used during this cycle, Desert Safety and Benefits of Risky Nature Play (Appendix A). The intervention infographics were provided to the participants via email. The participants had a week to review the content from each. Infographics were used to engage the participants with meaningful content that was easily approachable and digestible.

The Desert Safety infographic pulled general safety information from several sources. The Desert Safety infographic covered information on cactus safety, play in washes, hydration, sun protection, and animal encounters. This foundational information is meant for the participants so they may engage in conversations and share these tips with children and other adults. The Benefits of Risky Nature Play infographic had a similar purpose. It provided reliable information in an approachable and easily accessible way from on the benefits of risky nature play. The Benefits of Risky Nature Play infographic was four pages long, and it was determined that it needed to be shortened or broken up into smaller parts for future iterations. The infographic provided information on the numerous benefits of nature play. The infographics were well received by the participants. However, much of the information provided was something the participants were already familiar with due to their already engaged nature with Desert Botanical Garden.

The data collected for that cycle of research revealed several takeaways. In the pre- and post-intervention survey, caregivers indicated they were more likely to allow their children to engage with nature after viewing infographics on the safety and benefits of nature play in the Sonoran Desert. Seven interviews with caregivers were also conducted to triangulate the responses from the pre- and post-intervention surveys.

During these interviews, caregivers expressed interest in getting their kids outside more as a result of the intervention. On average, in the pre-intervention survey, children were outside for about 6 hours a week compared to the post-intervention survey with an average of about 10 hours a week. When caregivers' concerns for safety in the Sonoran Desert were alleviated, and they were exposed to the information about benefits of nature play for their children, they were more likely to allow their children to engage with nature.

From these early cycles of research, it was clear that caregivers need more safety tips and ways to engage with nature to encourage their children to play outside. The two cycles of research lead to this next cycle of research. This cycle of research connected with participants that live in the Sonoran Desert in and around the Phoenix Metropolitan area. Engaging with caregivers in the Phoenix Metropolitan area was necessary to develop an understanding of their perceptions of safety, risk, and benefits of nature play. Participants from the previous cycle were already taking steps to learn about practical ways to engage in nature play while staying safe and minimizing risk. The current cycle facilitated an understanding of the mindset of caregivers that were new to the concept of nature play and safety in the Sonoran Desert. These caregivers connected to the research and developed a deeper understanding of their perceptions of nature play and safety in the Sonoran Desert.

Action Research Study

In action research, there are two roles held by one individual: a scholar and a practitioner. The scholar is focused on researching previous studies to develop a holistic approach to the problem at hand. The practitioner, on the other hand, is focused on the

daily teaching or training of people and has recognized a situation that they seek to change. As a scholar-practitioner, the researcher is perfectly situated to research and implement interventions for this study. This topic is personal to the researcher, who was not raised in the State of Arizona but took trips to visit Arizona every summer with family. As the researcher reflects on time in Arizona as a youth, memories surface of playing in washes in Sedona, running around the desert parks in Phoenix, and discovering the flora and fauna of Arizona. Considering places to move to after high school, the researcher quickly relocated to Arizona to start a new chapter.

The researcher's experience is similar to numerous current residents of Arizona. In 2019, the U.S. Census Bureau estimated that Phoenix had a population of 1.6 million residents. According to a 2019 Bloomberg report, Phoenix was experiencing a growth of more than 200 new people each day (Florida, 2019). In 2019, Arizona had over 46.8 million overnight visitors that spent over \$25.6 billion during their visit (Arizona Tourism Office, 2019). Phoenix Sky Harbor International Airport had over 3.4 million domestic flights and 2.03 million international flights (Arizona Tourism Office, 2019). Surprisingly, only 39.7% of Arizona residents in 2017 were born in the state, according to data from the U.S. Census Bureau American Community Survey. The data indicates there have been many people traveling to Arizona in recent years. Numerous people travel to Arizona for recreation and eventually become permanent residents.

With so many people traveling to the state and eventually becoming residents, they need information on safety and the benefits of nature play for their children in the Sonoran Desert. A recent news article by Patrick Hayes (2021) notes, "Sarah Nelson lives in north Phoenix and does not like the caterpillars" (para. 3). The news article discusses

the recent boom in the caterpillar population around Phoenix with the most recent monsoon season. The news article speaks volumes about perceptions of nature. Hayes (2021) continues with a comment from Sarah Nelson: “My initial reaction is, here they come again...every couple of years they come down the hill and they’re just creatures I don’t like seeing in the area” (para. 4). The negative perceptions of nature mixing in with Phoenix residents is extremely common. Andrade and colleagues (2019) discuss the little scholarship to support positive attitudes toward desert landscape in Phoenix and Tucson, while also noting there is more research to suggest that residents of Arizona look less favorably on the desert landscape (p. 1849). If residents of Phoenix only see nature as a nuisance or in a negative light, they will be less likely to engage with it. Andrade and colleagues (2019) suggest the more time people spend in the desert landscape, the more they build an appreciation towards it and want to preserve it (p. 1849). If negative perceptions of the desert environment can be overcome, then more time will be spent enjoying it. Digging deeper into the literature bolsters concepts of nature appreciation.

Other literature supports the claims that time spent in nature builds appreciation for it. Larson and colleagues (2021) completed a survey on attitudes toward the bee populations in Phoenix. The results state, “[o]verall, attitudes toward bees were mostly neutral with a slight trend toward dislike but most residents [of Phoenix] did not believe bees were problematic at their homes” (p. 35). The results of their study suggest that Phoenix residents are indifferent to bees, but Larson and colleagues (2021) clarify that “people who live closer to desert parks had relatively positive attitudes toward bees” (p. 35). These results are consistent with the claim that the closer residents live to nature, the more likely they are to care about it. Considering landscaping, socioeconomic status

(SES) brings in a new component. Martin and colleagues (2004) conducted a survey on neighborhood socioeconomic status as a predictor of native landscape for those of different income levels. Martin and colleagues (2004) note:

[o]ur study intimates that residential vegetation composition in rapidly expanding, arid cities like Phoenix is largely driven by “luxury” and legacy effects and should be most rich in neighborhoods with the highest socioeconomic standing and most abundant in newest neighborhoods. (p. 355)

There is an unfair perception held by some that the privilege of spending time in nature belongs to those with money. This false perception, unfortunately, sometimes shows up as bias in studies. The sentiment that nature is free is often forgotten. Even if people live in an urban landscape like Phoenix, there are abundant places to go to enjoy nature for free. The individual perspective of any one person as to what and where nature is depends on how that person defines and engages with nature.

The City of Phoenix Parks and Recreation Department website states there are over 41,000 acres of desert parks and mountain preserves and 200 plus miles of trails. Millions of people enjoy them annually (City of Phoenix, n.d.). A majority of the City of Phoenix nature parks are free to the public. According to the 2020 City of Phoenix Annual Park Report, the city’s trail system saw over six million visitors (Anonymous, 2020). Many of the city's residents use the city parks. As stated previously, Phoenix has a population of over 1.6 million people. Visitors to the City of Phoenix parks could be visiting multiple times. Some visitors to city parks could be non-city residents. Phoenix has an almost even gender representation with 50% females and males, and the two highest ethnicity or race demographics in Phoenix are Hispanic at about 42% and white at

about 42%. The median household income is just above \$64,000, where about 94% of residents have computers, and about 87% have access to the internet. Only about 30% have a bachelor's degree or higher education. The national poverty threshold for four people, assuming two adults and two children, is around \$34,000 in household income in a year (U.S. Census Bureau, 2023). Most of these demographic indicators can shed light on issues of accessibility to natural resources in Phoenix. Illustrating access to nature spaces and demographics will follow.

Several studies have reviewed the relationship between demographic indicators and access to natural spaces like parks. Wen and colleagues (2013) examined spatial disparities in the distribution of parks and green spaces in the U.S. based on census tract data and, in particular, income. Their results indicated that as poverty levels increased, access to green spaces decreased in urban centers but was reversed in rural areas. Hispanic and African American percentages were also negatively associated with the distance to green spaces along the urban and rural continuum (Wen et al., 2013). Larson and colleagues (2016) reviewed the relationship between access to parks and health-related outcomes in urban centers across the U.S. by looking at different variables, one being income. The results indicated green space access, quantity, and quality were positively associated with financial well-being based on an individual's sense of economic security and being able to meet their basic needs (Larson et al., 2016). Jarvis and colleagues (2019) studied access to green spaces and parks in Metro Vancouver, Canada, and looked at several factors including income. Their findings suggest that access and exposure to green spaces were associated with area-level marginalization of diverse populations (Jarvis et al., 2019). There are numerous factors that influence access

to green spaces and parks. Developing an understanding of the different socioeconomic factors that support access to green spaces is vital to this research.

Utilizing socioeconomic status as an indicator to illuminate the issues of accessibility of natural resources is essential to connecting caregivers and their children to the Sonoran Desert. The natural environment is the perfect place to learn and grow for everyone.

Conclusion

The study's focus was on changing caregivers' perceptions of risk, safety, and benefits of nature play for their children in the Sonoran Desert. Prior studies have examined those that have some familiarity with nature play in the Sonoran Desert in structured outdoor settings. Through engaging participants from other areas around Phoenix, however, a more nuanced understanding of perceptions of risk and nature play in the Sonoran Desert will be illuminated. The study will specifically address the following three research questions:

1. If participants were informed of the safety and benefits of nature play, would their perceptions and their children's interactions with nature change?
2. How and to what extent did socioeconomic status influence the way that caregivers perceived and engaged with nature play, as a result of the intervention?
3. How and to what extent did participants engage in and find the intervention useful?

It is hypothesized that understanding and changing caregiver perceptions of safety, risk, and benefits of nature play in the Sonoran Desert will increase time spent outside and increase nature play activities, at the same time increasing access to nature (or perception

of access to nature) for communities in all socioeconomic status. Utilizing infographics and positive communication will create a positive experience for caregivers finding the intervention useful.

CHAPTER 2

LITERATURE REVIEW

Statement of Purpose

Depending on when studies were conducted or what region of the world the study took place, the terms nature play, risky nature play, unstructured play, or free play represent similar aspects of children engaging with nature. Nature play is defined as any activity that allows children to learn together in a space where they develop skills, engage their imaginations, and develop an understanding of the world around them without the need for parental or adult supervision (Moore & Cooper, 2014). Risky nature play often occurs without parental or adult supervision, is exciting, and involves uncertainty and risk of injury (Sandseter, 2010). Unstructured play supports learning through cooperation, imitation, and trial and error (Fatai et al., 2014). Similar to unstructured play, free play allows children to have the freedom to play in open-ended and creative ways (Karlsen & Lekhal, 2019). Both unstructured play and free play can take place inside or outside, while nature play and risky nature play typically occur in nature both inside and outdoors (Stover, 2016). Though nature play can happen inside, for this intervention, nature play is focused on play outside the children's domicile. In order to understand caregivers' perceptions of nature play, expansive discussion on the benefits of nature play will follow.

This study sought to connect caregivers and their children to the Sonoran Desert. The Sonoran Desert has inherent risks (U.S. Department of the Interior, n.d.), however nature play has numerous benefits (Bento & Dias, 2017). Safety is a factor when considering children's play activities. There is no way to eliminate all risks and risk is an

integral part of childhood. Taking risk allows children a deeper self-awareness and the ability to determine which actions suit their comfort level (Sandseter, Sando & Kleppe, 2021). Caregivers might find a nature play activity too risky, but the child might already understand the risks involved. Risk allows children to develop problem-solving and critical-thinking skills (Brussoni et al., 2012). Eliminating nature play for children would diminish not only children's ability to connect with nature but also their development of foundational skills that are necessary later in life. Caregivers' perceptions of nature play are central to connecting children to it.

Caregivers control children's play activities insofar as they are the authority on the activities their children can do. If a caregiver finds an activity too risky, they could shepherd their children away from that activity (Ernst, 2017). When considering nature play in the Sonoran Desert, there are effective ways to engage in play that diminish safety concerns. This study offers caregivers valuable insights into common concerns related to children's nature play activities in the Sonoran Desert, as well as essential strategies to reduce risks and reap the benefits of engaging with nature.

Play is a central part of any childhood. However, different types of play are sometimes deemed too risky due to many factors such as strangers or the potential for physical harm (Brussoni et al., 2015). Strangers and physical harm are valid reasons for concern. Play is essential for fostering children's creativity, imagination, and dexterity, as well as their physical, cognitive, and emotional development (Allen & Kelly, 2015). Play fosters different types of learning, such as cognitive skills, physical abilities, new vocabulary, social skills, and literacy skills (Ärlemalm-Hagsér & Elliot, 2021). Play allows children to develop healthy exercise habits and decrease obesity (Sanchez-Lopez

et al., 2020). Play can also reduce stress, because children can release anxiety and stress through movement and connecting with others (Fiorelli & Russ, 2012). Play takes numerous forms and substantially benefits children (Tsai, 2012). Different play types like symbolic, sociodramatic, functional play, and games allow children to experiment with different life situations and learn how to engage with others effectively (Pramling N. et al., 2019). Play will look different for different ages and stages of development (Christie & Johnsen, 1987), but it is an essential component of learning for all ages. Learning outcomes for children can be supported in different ways throughout different developmental stages.

Children learn an exorbitant amount from birth to age five. For babies, play may be challenging as they cannot move or talk with caregivers. In infancy, babies start to mimic their parents' facial actions and noises (Allen & Kelly, 2015). When children become toddlers, their play options increase, and toddlers can learn about colors, sizes, objects, puzzles, jobs, life skills, etc. When children progress to preschool ages, three to five years of age, they become more independent and start to develop an understanding of the world around them. At this stage, play becomes more self-directed and structured with the introduction of rules in games and the exploration of complex concepts through dramatic play and games (Lillard, 2015). When children progress to school, ages six to 18, they are incredibly independent and focused on school activities to develop their identity (Verhoeven, Poorthuis & Volman, 2019; Wretman, 2017). Children during these ages can start engaging in more structured activities like sports, family events, and other activities. Understanding different developmental stages illuminates the potential issues for a lack of play experiences.

If children are not afforded the ability to play, there can be a few dramatic consequences. Children who do not play outside in nature have been shown to be at higher risk of attention deficit hyperactivity disorder or similar cognitive issues (Panksepp, 2007; Kuo & Taylor, 2004). There is also an increased risk of obesity due to a lack of movement (Absari & Pettit & Gershoff, 2015). Play allows children to build cognitive skills, and if they cannot engage in activities that foster cognitive development, they can struggle with creativity, social skills, and emotional development (Ahmad et al., 2016). There is also a link between play and stress levels (Chatterjee, 2018). If kids cannot play, they could be unsure of how to process lived experiences (Chatterjee, 2018). Play should be a central part of every child's early years and adolescence. Issues could arise later if play is lacking during children's different developmental stages.

Theoretical Framework

Constructivism

Constructivist theory allows learners to create their own meaning through experiences. Given (2002) describes constructivism as "...each individual construct[ing] knowledge and his or her experience through social interaction" (p. 1). This definition of constructivism shifts away from gaining knowledge through explanation and instead moves toward understanding the world through interactions with others (Given, 2002). Other scholars have defined constructivist theory as "...a view of human beings ... actively constructing knowledge, in their own subjective and intersubjective realities and in contextually specific ways" (Coghlan & Brydon-Miller, 2014, p. 1). These definitions are similar. Given's (2002) definition is focused on the individual's interactions with each other, while Coghlan & Brydon-Miller's (2014) definition focuses on the human

experience in totality. In the educational discipline, Jones & Braber-Araje (2002) define constructivism as a way of knowing that fosters learners' ability to actively engage in the meaning-making process and change the focus from knowledge being a product to knowledge being a process. Shifting the idea of learning away from simply learning facts and information and focusing on learning as a process changes our understanding of how learning takes place. Learning occurs by creating connections between the learner and the content.

Understanding social constructivism is essential to comprehend the learning and meaning-making in this process. Kim (2001) defines social constructivism as a way to emphasize culture and the context of knowledge within society as one creates knowledge based on interactions with others. Understanding one's own culture assists in the learning process. This understanding is built upon prior experiences and grows as the individual pursues connection with others inside or outside the culture. Amineh and Asl (2015) expand on Kim's (2001) definition of social constructivism by elaborating on the mechanisms that define social constructivism. Amineh and Asl (2015) point out that reality happens when humans interact and is therefore discovered by individuals. Next, knowledge is a product of human interactions; individuals create meaning when interacting with each other and the environment. Finally, learning is not passive. It is fostered through the social process and not only on the individual level. Learning occurs through individuals engaging in social activities and collaborating with others (Amineh & Asl, 2015). The social nature of humans is central to this study because the interactions between caregivers and the web-based content will foster experiences that create an environment for learning and for changing perceptions around safety and nature play.

The learning and meaning-making process can be present in the knowledge acquisition process.

All of the definitions of constructivism point to the importance of making meaning with a lived experience to form deeper connections to the content of safety and nature play. Through the meaning-making process, learners create and refine ideas. Constructivism will be defined as the process of meaning-making through engagement with others in social interactions, as well as with people and their environment throughout the study.

Constructivism and Social Media

This study used social media, specifically Instagram, to deliver the intervention content and as a space to connect by sharing experiences and building knowledge. Constructivist theory supports the use of this intervention method. Social media is a space for learning through interactions with content and to challenge or reinforce ideas (Schrader, 2015). Individuals can create new meanings and understand different topics through social media interaction. Greenhow and Lewin (2016) argue that social media practices align with a social constructivist view of learning because these practices involve participation in the knowledge production process in social spaces that are accessible to everyone with an internet connection, provision of a space for discussion or evaluation of content, and connection to numerous users across the platform. Social media allows the learner to connect to the topic and build knowledge from different users to support learning. Providing an online space to connect with the content allows for continued meaning-making.

Scholars have studied the use of social media in learning over the past decade. Social media allows the public and other entities to express their opinions and messages and connect with others (Jha, 2019). Facebook and Instagram are common social media platforms that the public and other entities, such as businesses, use to connect with others, share ideas, promote products, and offer other services to the public and organizations (Nuseir, 2020). Noh and Jing (2017) studied connections between learning and Facebook. The researchers explained that, as humans, we use tools to interact with our social environments and the people in those environments. These tools provide mediums to communicate with others within our social environments effectively. The participants in the study used Facebook as a way to communicate with each other and to connect. Through those online interactions, learners made new meanings for the content. In addition, Adekantari (2020) studied the impact of Instagram on students' project-based learning and critical thinking skills. Adekantari (2020) espoused constructivist theory as a medium for students to create knowledge from their environment and prior experiences. Learners can create meaningful learning opportunities as they connect to the information and build on the experiences in an online environment. Social media will provide avenues for participants in the current study to connect to information on the safety and benefits of nature play in the Sonoran Desert.

Social media platforms like Instagram are spaces for educators to connect with like-minded groups to share information and resources. Carpenter and colleagues (2020) reviewed social media, specifically Instagram, and educators' activities on that platform. The study utilized Instagram to collect survey information from educators across the platform to understand how the educators use it as well as its impact on them

professionally (Carpenter et al., 2020). The study revealed that educators use Instagram for various professional purposes like acquiring and sharing knowledge to provide emotional support and develop a community (Carpenter et al., 2020). Carpenter and colleagues' (2020) study reveals that Instagram is a space for educators to connect and share information about their profession. Instagram is a space to foster social constructivism, insomuch as it has the ability to create a community for educators and other groups, like caregivers. These groups can then acquire and build on knowledge to support their desires to learn and grow together. Social media is a space that supports numerous purposes.

Numerous people and groups utilize social media for many purposes every day. Lindström and colleagues (2021) analyzed over a million posts from over 4000 individuals on different social media platforms to understand the principles of reward learning behavior, then created four different computational accounts that would mimic critical aspects of social media posting to maximize engagement. Their results support a reward learning account of social media engagement and provide insight into modern human behavior on social media (Lindström et al., 2021). Lindström and colleagues' (2021) research that provides evidence that aligns with a social constructivist perspective in relation to social media platforms. The study suggests these platforms allow for social connection and engagement, which fulfills the need of human social behavior to connect and, while connecting, allows them to develop meaning around the content they encounter. Other scholars like Li and Xie (2019) evaluated image content on social media engagement. Li and Xie (2019) divided social media engagement into two categories: the first is likes, comments, and favorites, and the second is sharing or promotion of original

posts. The study results showed that image content builds a post's engagement through presence, image characteristics, and image-text fit (Li & Xie, 2019). These findings support social constructivism because gaining more engagement with the image posts will foster a social connection between the individual and groups that utilize social media. Through social connection, individuals and groups will continue to build on their knowledge in this study. Social connections through Instagram are vital to the study, but a deeper sense of the current impact Instagram has on the population is needed to contextualize it within the current zeitgeist.

Adults are using social media to connect and engage with one another. Two recent articles by Pew Research Center and Gallup Poll highlight the uses and impact Instagram have on Americans today. According to Schaeffer (2021), young adults (18-29) are most likely to utilize Instagram and connect at least once a day on the platform. This is supported by Jones (2023) where a majority of adults 18-34 use Instagram daily or weekly while Americans 35-54 generally utilize Facebook more often than Instagram. American young adults 18-34 are more likely to post on Instagram compared to adults 35-54, who are more likely to post on Facebook (Jones, 2023). In general, women are more likely to utilize Facebook and Instagram than men (Schaeffer, 2021), while Black and Hispanic Americans are more likely to use Instagram compared to White Americans (Schaeffer, 2021). Instagram is a useful tool to connect and engage diverse communities. Social media can be accessed through websites on many devices.

Web-based interventions have a solid foundation in the literature. Scholars have used web-based interventions to understand the impact of interventions on behavior changes (Brussoni et al., 2021; Murray, 2012; Masse et al., 2015). One study focused on

reframing mothers' perceptions of risk and changing parenting behaviors. This was implemented with an in-person control group and a web-based experimental group. It used a web-based intervention to deliver information about tolerance for risk in play from a mothers' perspective of their children's nature play activities (Brussoni et al., 2021). The study showed an increase in tolerance of risky play on the Tolerance of Risk in Play Scale (TRiPS) while proving that web-based interventions were effective at increasing mothers' tolerance for risk in play (Brussoni et al., 2021). The web-based interventions can be used to assess changes from participants in those studies. Other scholars have used web-based interventions to support their research efforts.

Web-based interventions are effective at communicating information to the participants. Corkum and colleagues (2019) utilized a web-based intervention to support teachers of elementary students with attention deficit hyperactivity disorder (ADHD). The study results indicated that the web-based support system effectively reduced ADHD behaviors (Corkum et al., 2019). The study provides evidence that web-based interventions can effectively communicate information to the participants and encourage behavior differences. Marsac and colleagues (2011), utilized a web-based intervention to communicate with parents after their child experienced an injury that included post-traumatic stress symptoms. Their results show web-based interventions are effective for increasing parental knowledge about their child's recovery and reactions after injuries (Marsac et al., 2011).

Similarly, Suárez and colleagues (2018) evaluated the effectiveness of a web-based parenting program to promote positive parenting with Spanish-speaking parents. The results of their study suggest that the parents that utilized the web-based tools were

more connected and reported an increase in their parenting skills (Suárez et al., 2018). Web-based interventions offer another avenue for implementing interventions to connect participants with information and report behavior changes. One aspect of web-based interventions that is vital to their effectiveness is communication.

Educators use visual communication to create effective learning environments. Visual explanations have been linked to improved student learning outcomes (Sless, 1981). Students can recall visual information more accurately (Borkin et al., 2016; Gilakjani & Branch, 2012). Visual communication, like infographics, is linked to increased student motivation to learn, clarification of content, vocabulary enhancement, and direct experience as sensory objects that initiate or stimulate learning (Shabiralyani et al., 2015). Infographics are a data visualization tool that combines text and images to convey complex ideas creatively and efficiently. Infographics support the transmission of information through different platforms.

First, infographics must be defined to understand their purpose and function. Krum (2014) defines infographics as a “larger graphic design that combines data visualizations, illustrations, text, and images into a format that tells a complete story” (Krum, 2014, p. 6). Infographics are more than just data visualization; they effectively tell a story about the data and information. Another working definition of infographics comes from Polman and Gebre (2015): infographics are visual representations of data and provide ways of communicating information visually. Taking complex information and distilling it into the most critical parts is essential to communicating information to participants through web-based intervention. Infographics support the meaning-making process through visual communication.

Infographics assist in communication with others, create an environment to make meaning from content, and foster multiple perspectives. Infographics can allow students to think critically about different types of information (Elaldi & Cifci, 2021). Scholars have indicated that infographics aid students in organizing information in a logical way (Alrwele, 2017). Introducing multiple perspectives generates an environment for students to develop new understandings of a particular topic and can shift their perspectives (Gebre, 2018). Visual communication and infographics are employed in this study to shift the perspectives of caregivers from one of uncertainty about their children's outdoor play time to one that is more inclusive and holistic. Researchers have employed infographics as learning tools in their classrooms; they have been shown to effectively communicate information and facilitate understanding of complex concepts (Alrwele, 2017). This study utilizes infographics in order to connect caregivers to the benefits of nature play as well as trends and patterns of safety during nature play in the Sonoran Desert. Due to infographics' ability to contextualize information into digestible pieces, they are utilized on social media platforms.

Infographics are a popular method for communicating information on social media. Traboco and colleagues (2022) described best practices for creating infographics for science communication. Their research suggests that to make effective infographics, there first needs to be a clear objective. After that is decided, the layout, colors, fonts, and context are considered, as they are crucial for scholars to communicate information to the public through social media (Traboco et al., 2022). These features are essential for disseminating scientific research and educational information to the public through social media platforms. Scholars in the health profession have utilized infographics on social

media platforms to communicate information to the public. Thoma and colleagues (2017) reviewed articles from the Canadian Journal of Emergency Medicine to assess which articles would significantly impact the public. The results support that infographics facilitated increased connection to the information but did not lead to a deeper connection with the content, like opening a full article might do (Thoma et al., 2017). Infographics communicate information effectively but sometimes do not lead to deeper engagement with the promoted articles. Utilizing infographics is essential to build social media networks, but it is up to the account holder to ensure that the information is accurate and digestible for the desired audience.

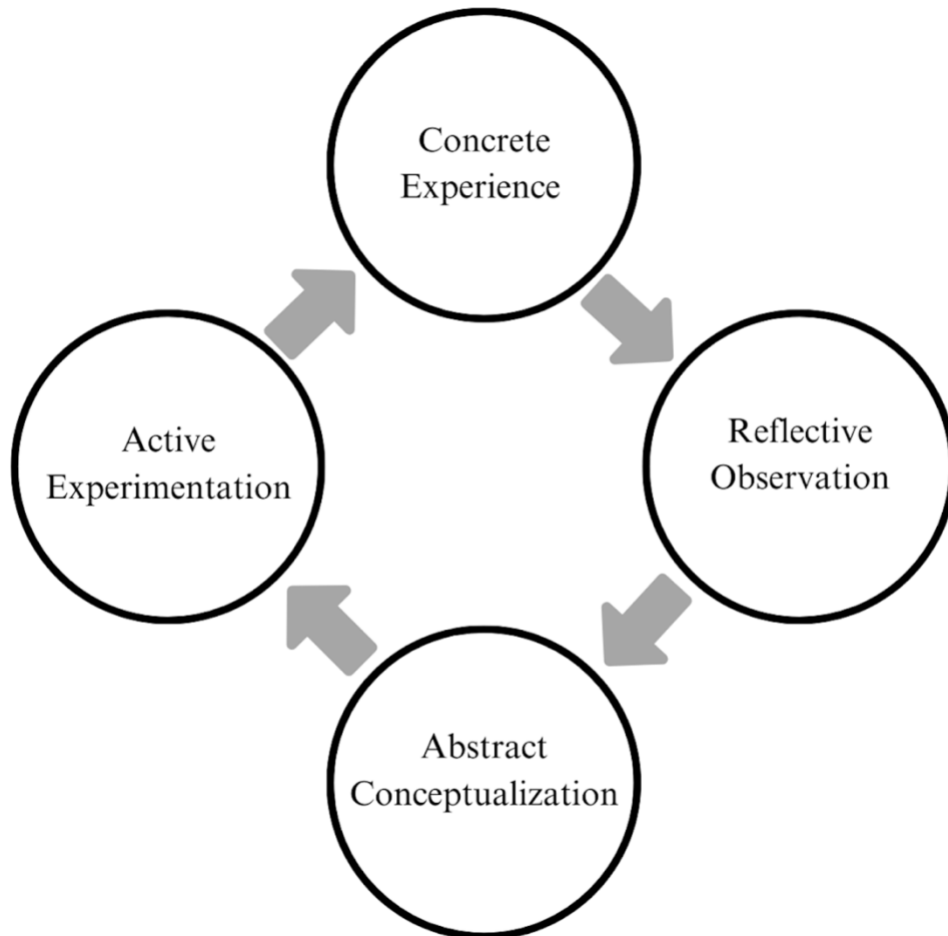
This study used infographics because of their ability to attract attention to visually appealing information and to encourage information retention. When infographics contain engaging visuals and accurate information, the information is more likely to be shared with others (Kunze et al., 2021). Sharing the content of the study is essential to creating a more significant reach to the community of caregivers that are unsure of how to safely engage in nature play in the Sonoran Desert. Research has shown that when directions are given with visuals, students are more likely to perform the task accurately than those who were only given verbal or written instructions (Bobek & Tversky, 2016). Taking complex information and distilling it into its essential parts before communicating it to the public creates a space for participants to acquire knowledge and be more likely to share it. Through the use of infographics, the study will be more likely to connect with a larger audience.

Experiential Learning Theory

Experiential learning theory (ELT) draws on constructivist theory to focus on the meaning-making process through experiences in the world. ELT was first published in 1984 by David Kolb. The work, titled *Experiential Learning: Experience as the Source of Learning and Development*, outlined Experiential Learning Theories' primary components. Kolb (1984) describes a cyclical process where the learning takes part through concrete learning, reflective observation, abstract conceptualization, and active experimentation. In the first two stages of the process, the learner is involved in the experience of learning. Then, in the second part of the cycle, the learner transforms that experience into knowledge, understanding, or information (Kolb, 1984). The learner can start in any part of the cycle, which will theoretically continue forever (Kolb, 1984).

Figure 1

Kolb's Experiential Learning Cycle



Note: From Kolb, D. A. (1984). *Experiential Learning: Experience as the Source of Learning and Development*.

Figure 1 visually displays the learner's exposure to and processing of new information. Learners are exposed to a concrete concept, observe and reflect on that experience, and develop abstract ideas surrounding the learning. This leads to active experimentation with the content. This experiential process is learning by doing (Kolb, 1984). Learning by doing was an essential part of the current study.

Participants in this study entered with their perceptions of safety in nature and the benefits of play in the natural world in the Sonoran Desert. Their initial experiences in nature are central to the process of ELT. Participants built on their past experiences to interrogate the abstract conceptualizations and observations in the content of the intervention. The participants' initial perceptions of nature afford them a reference point in regards to feelings and meaning, and then, by engaging with the content of the intervention, they are reflecting on their past experience to create new perceptions of the safety and benefits of play in the Sonoran Desert. Assuming participants engaged with the intervention and spent more time in nature, they could have gained a new perspective and reframed their old perceptions about the Sonoran Desert. In an online format, the participants moved through the stages of the experiential learning cycle by applying their knowledge through comments and connection to the content. Participants were asked to reflect on their past experiences to create new meanings and perceptions and share their experiences online to make connections with others. The desired outcome was creation of new experiences and meaning as they increased engagement with the environment in their own spaces. ELT supported the intervention process through the design of social media posts and content.

ELT and constructivism were used in this study as the foundation for the content of the intervention and for exploring participants' impressions and meaning-making of the materials they read. Mughal and Zafar's (2011) analysis of Kolb's learning cycle supports the constructivist learning theory where knowledge is created from the learner's experiences but also from multiple perspectives that are apparent or not apparent to the learner. ELT and constructivism support each other by providing modes of interpretation

of the learning cycle and connection to the content. Knobloch (2003) supports Mughal and Zafar's (2011) notion of the connection between ELT and constructivism by pinpointing that learning takes place in reflective practices, application, and problem-solving. Through the experiential learning process, constructivist components emerge through different learning experiences. The literature on ELT and constructivism bolstered the components of this study on safety, risk, and benefits of nature play in the Sonoran Desert.

In conceptualizing nature play, safety is a factor to consider for learners. Maslow (1943) established principles for creating a learning environment that incorporates student safety because students can engage with the learning content when they feel safe. Outdoor education or nature play is deeply rooted in the process and experience of learning and meaning-making. Nicol (2014) rightly connected nature experiences and learning through whole body experiences where the body, mind, and nature connect the learner to their self, community, and culture. Experiencing nature through learning builds a deeper connection to it through meaning-making. The interactions between ELT and constructivism facilitate the connection of the learner to the experience of being in nature, leading to an understanding of various concepts. Learners must feel knowledgeable about ways to be safe in those environments for the learning process to occur.

ELT and Nature Play and Safety

ELT has been used as the foundation for outdoor and environmental education content for years. From an environmental education perspective, ELT is “a process through which a learner constructs knowledge, skill, and value from direct experiences” (Bisson, 1996, p. 6). The definition shares similarities with the constructivist definition of

creating meaning through experiences. ELT supports nature play by connecting children to the benefits of being outdoors. Haas and Ashman (2014) argue that experiential play with nature supports children's development. Children's time in nature fosters their growth and development through different learning experiences. In order to get to learning experiences, the base level needs should be met.

ELT connects nature play to the importance of psychological safety, which is essential for caregivers to allow their children to play in natural spaces. Wanless (2016) defines psychological safety as “the degree to which individuals feel comfortable taking positive interpersonal risks (such as trying something new).” Kolb and Kolb (2009) discuss the importance of building learning environments that support psychological safety, have a purpose, and promote learning. Engaging in a learning experience safely and knowledge of safety is essential to facilitate the learning process. When participants in the study are engaging with nature in a new way, the participants might be unsure of how to best engage with the natural environment. Singer and colleagues (2009) conducted a study to understand play across 16 different nations worldwide in regards to parental concerns of safety during their children's playtime. Singer and colleagues (2009) argue that mothers struggle to prioritize play and experiential learning with their children due to safety issues and time. Developing strategies to connect caregivers with resources for safety practices in nature is essential to this study. The literature suggests that by giving caregivers more information, the caregivers will have an increased understanding and belief in the safety of these nature play activities.

Play and Nature Play and Childhood Development Literature Review

Play can be a central part of any childhood experience. Play provides numerous developmental benefits like building cognitive, physical, social, and emotional well-being while allowing children to discover the world around them (Ginsburg, 2007; Pyles, 2016; Schrader, 1990; Pellegrini & Holmes, 2006; National Research Council et al., 2015; Mason et al., 2021). Through these skills, children learn to deal with challenging situations and develop confidence, self-esteem, resilience, social skills, and curiosity (Hurwitz, 2002; Erickson, 1985; Band & Weisz, 1988; Tomlinson, 2014; Heckman, 2007). Play supports children's physical health through agility, stamina, coordination, and balance (Mulovhedzi et al., 2017). Children develop social skills through play by exploring their feelings, developing self-discipline, learning to express themselves, and developing an understanding of emotions (Hurwitz, 2002; Erickson, 1985; Pellegrini & Smith, 1998; McElwain & Volling, 2005; Ulset et al., 2017; Malik & Marwaha, 2018). The literature well supports the developmental benefits of play, and caregivers can utilize play to support children's learning outcomes. Play can be central to child development and with caregiver support.

Caregivers can support children's development through play. However, caregivers must allow children the freedom and independence to choose their play activities. Parker and colleagues (1999) found that caregivers who support their children's independent play behaviors were likelier to have children who would gain more cognitive competencies and independence than children of caregivers that did not support their children's play behaviors. Ihmeideh (2017) evaluated caregiver perceptions and engagement with their children's nature play experiences, and results indicated that

caregivers valued play for their children's development and learning, however the study also found lower engagement levels with play than expected. Metaferia and colleagues (2020) examined the relationship between caregiver play beliefs and their children's executive functions. Their results suggested that children of caregivers who support play were more likely to engage in play experiences, leading to higher cognitive and executive function development (Metaferia et al., 2020). Caregivers' support of children's play experiences is essential to learning. Caregivers that support their children's play can support their children's development.

During risky play, children can challenge themselves to learn new skills like riding a bike or swimming. Dodd and colleagues (2021) conducted a survey of caregivers of children ages 5-11 in the U.K. The survey indicated that caregivers of children who had positive attitudes around children's risk-taking play time led to more time spent incorporating nature play at a younger age (Dodd et al., 2021). Jelleyman and colleagues (2019) reviewed caregiver perceptions of their children's risky play behaviors and barriers to engaging in risky play in New Zealand. The results indicate that caregivers were more worried about road safety and stranger danger than their children's risky play activities. The caregivers also generally agreed on the benefits of exposure to risk and challenge, yet most of the children were less likely to engage in this type of play (Jelleyman et al., 2019). Caregivers did not have the confidence for their children to engage in risky play, and further research is needed to address the barriers and fears around risky play (Jelleyman et al., 2019). This research will address barriers and fears of caregivers in order to support them and their children in their risky nature play behaviors. Coe (2017) researched a Canadian Forest School and the impact risky play had on

children. The study results indicated that children benefit from risky play on multiple levels. Educators should not shy away from children's risky play behaviors and can support them in multiple ways (Coe, 2017). Risky play is developmentally appropriate for children at many stages of their development. To contextualize children's learning and play experiences, a brief discussion on technology and children's learning will follow.

Although children's use of technology is not a central part of this study, understanding the impact of children's access to technology is necessary to address since access could be a reason for not engaging in nature play. Plowman and colleagues (2009) evaluated technology in the homes of young children ages 3-4 and caregivers' perceptions of its impact on their child's development. The results suggest that caregivers have some anxieties about technology for young children. However, caregivers do not think it threatens their children's childhood and believe the danger might be overstated by different organizations (Plowman et al., 2009). If caregivers favor using technology, their children are more likely to have access to it. The use of technology can support children's development if used appropriately. Papadakis and colleagues (2018) assessed the impact of digital technologies on children's ability to understand numbers. The study results indicate that when technology is used intentionally with developmentally appropriate software, it can enhance children's ability to develop number sense (Papadakis et al., 2018). The critical factor here is the purposeful utilization of technology to meet the child's needs, not the freedom for the child to use technology however they desire. Kucirkova and colleagues (2021) reviewed caregiver perceptions of technology and its impact on their children in Japan. The study concluded that parental perceptions of the

risks of technology and its benefits are at odds with each other, as they see the benefits of technology but are also concerned about its impact (Kucirkova et al., 2021). Technology is unavoidable in today's society. However, technology should be introduced to children at an appropriate age and developmental stage. Poveda and colleagues (2020) conducted a study on caregivers' perceptions of technology in the home for children ages 0-3. In the study, caregivers' fears were alleviated by communal use where caregivers use technology with their children and time boundary setting where caregivers limit the amount of time their children are using certain technologies. These methods support their children's agency and alleviate their own fears about technology use by setting health time boundaries (Poveda et al., 2020). It is essential to understand the impact technology has on childhood development and how caregivers play a critical role in their children's digital play activities. Assessing technology's place in children's lives is important to contextualizing nature play benefits.

Building off the literature, nature play can be argued to provide numerous developmental benefits for children. Moore and colleagues (2019) evaluated children's perspectives on nature play environments. The research suggests that children engaging in nature play build their self-confidence through the freedom to decide on their nature play behaviors (Moore et al., 2019). Puhakka and colleagues (2019) evaluated nature play spaces and their impact on students ages 3-5. The results of the study suggest that nature play spaces provide children with avenues to develop creativity and imagination (Puhakka et al., 2019). Prins and colleagues (2022) completed a review of the literature on nature play environments. The results support natural play environments and show healthy physical development for children participating in these spaces (Prins et al.,

2022). McCree and colleagues (2018) evaluated students in a forest school over three years. The study's findings show a positive correlation between children's problem-solving and critical-thinking development and enhanced academic performance across various subjects, surpassing their peers in formal school settings (McCree et al., 2018). Wells and Evans (2003) evaluated rural children in 3rd through 5th grade and their experiences with nature play. The results of their study show that nature experiences improve children's stress levels and well-being (Wells & Evans, 2003). Nature play environments provide numerous opportunities for children to develop positive behavior and social, cognitive, and physical skills. Even with the numerous development benefits of nature play, risk is often present during these activities.

Safety and Nature Play Literature Review

Safety is a top concern for caregivers when their children are engaged in nature play. Much literature exists on ways to stay safe in nature play settings. Brooks (2006) discusses the importance of understanding safety standards within local or site-specific contexts because each context depends on unique characteristics only pertinent to that location. Caregivers need this information in a digestible format that can easily break down what they need to know about safety in the desert. Valentine and McKendrick (1997) showed the impact of what happens when caregiver concerns for children's safety outweigh the benefits of independent play. If caregivers were overly concerned with children's play in different environments, children were less likely to engage in those learning activities (Valentine & McKendrick, 1997).

Similarly, Sandseter (2009) looked at educator perceptions of safety in natural play settings compared to human-configured play environments. Sandseter (2009) found

that both the natural and human-made environments like playgrounds provided numerous opportunities for children to engage in risky play. However, the staff's comfort with the children's actions in those environments impacted the number of risky play behaviors the children participated in. Children who play unrestricted learn to mediate their bodies (Lee, 2020). As children develop a sense of their bodies, they can learn how to navigate the natural world and develop connections to it. Burssoni and colleagues (2012) note, "This paradigm shift represents a potential for epistemological growth as well as cross-disciplinary collaboration to foster optimal child development while preserving children's safety" (p.1). Balancing the risk associated with nature play environments and benefits to child development is essential for children to create necessary skills for their future. Perceptions of the safety and risk associated with nature play shape children's experiences with it.

Caregiver perceptions of risk, safety, and benefits of nature play are the central theme of this study. Scholars have provided a solid foundation in order to create an environment to support caregivers and children in their nature play activities. Truong and colleagues (2022) identified that caregivers know the importance of nature play, yet their concerns over their children's play behaviors are a barrier. Shaw and colleagues (2015) completed a qualitative study on caregiver perceptions of nature-based outdoor experiences. The results of the study shed light on how barriers to participation in nature-based experiences were due to fear of the unknown and unfamiliarity with the topic, schedule conflict, resistance to participation in nature experiences, cost of participation, difficulty accessing outdoor locations through geographical and financial constraints, and time (Shaw et al., 2015). Mart (2021) employed a qualitative study using semi-structured

interviews of parents with a child attending kindergarten in Turkey. The study revealed six themes of risky play that children participated in: children's approaches to outdoor activities, parental feelings, parents' safety concerns, parental perspectives on outdoor activities at schools, the impact of outdoor activities, and parental preferences for activities (indoor vs. outdoor). While caregivers in the study acknowledged the benefits of children being outdoors, safety was a concern, and so they preferred indoor activities over outdoor ones (Mart, 2021). In these three studies, caregivers were concerned with their children's nature play experiences due to safety issues or the caregivers' lack of awareness. In some cases, the caregivers were aware but their fear of risk was too great to allow their children to fully engage in nature play activities. These studies occurred in different regions and had similar findings on caregiver fears of risk and benefits of nature play. This research will expand on previous work by specifically studying caregivers who live in the Sonoran Desert.

The literature provides a deeper understanding of the importance of nature play for children's development. Pellegrini and Smith (1998) noted the benefits of physical play for cognitive performance but suggested there needed to be more research on the benefits of physical play for cognitive benefits. Playing in nature allows children to build cognitive skills through interactions with nature. McFarland and Laird (2018) concluded that risky nature play was beneficial to the development of children. Ward and colleagues (2017) discussed how beneficial nature play programs are for children's development. There is a need for more research on the benefits of these programs for children and their caregivers. Nature play provides numerous benefits to children, from connecting with nature to developing cognitive, behavioral, social, emotional, and problem-solving skills.

Sandseter (2007) established six categories for evaluating nature play: “1) Play with great heights, 2) Play with 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.” These six categories were used to assess parental concerns for their child’s safety in nature.

Aligning each category with nature play will provide a foundation for understanding the application of each of the six categories. Sandseter and colleagues (2021) evaluated risky play behaviors in early childhood centers and found that play at great heights took place in natural spaces like trees, and play at high-speed involved sledding on snow. Bundy and colleagues (2009) introduced loose parts to primary schools in Australia and provided examples of play with harmful tools like wood planks and water containers. Obee and colleagues (2020) evaluated how children use environmental factors and perform human behaviors that impact risky play in young children. The research team identified play near campfires as an example of play near dangerous elements, play on hills as an example of rough-and-tumble play, and hiding in or under loose parts like planks and plastic crates as an example of play where children disappear or get lost (Obee et al., 2020). Illustrating the different types of risky nature play allows for assessing the amount of risky nature play and its impact on children’s development.

Time spent in nature is essential for children to build self-confidence (Gill, 2014). Children start to navigate risks and develop physical abilities that will last a lifetime (McFarland & Laird, 2018). By spending time outside, children learn how to be independent (Green, 2013). Experiencing nature in real time and away from technology

provides room for children to explore nature independently. They are developing the foundational skills for independence and decision-making (Dankiw et al., 2020). Spending time in nature produces more physically active children (Gill, 2014), and being physically active outside decreases attention deficit hyperactivity disorder and obesity (Taylor & Kau, 2009; Ansari et al., 2016). Aside from decreases in physical and cognitive disorders, nature play activities allow children to build muscle and stamina and improve their motor skills (Dankiw et al., 2020). Children in nature can be inspired and create a healthy imagination (Wojciehowski & Ernst, 2018). By engaging with nature, children develop the senses of touch, sight, smell, and hearing through exploration and curiosity (Franco et al., 2017). By developing social-emotional skills, nature play can create stronger friendships and better mental health outcomes (Kuo & Taylor, 2004). Children's time in nature increases their resilience (Ernst et al., 2018), and can result in children being more likely to build empathy towards nature and wanting to preserve it for future generations (Barrable & Booth, 2020). More time in nature can lead to more significant development benefits. Children receive numerous benefits from spending time in nature.

Nature play can be part of every child's life. Nature allows children to observe and discover what interests them (McClain & Vandermaas-Peeler, 2016). Children learn different facets of nature through their experiences with self-directed play (Kuo et al., 2019). Nature play generates child socialization and social-emotional skills, problem-solving, safe risk assessment, game creation, and rule following (Dowdell & Malone, 2011). Children build empathy toward nature through connecting and playing with it (Lithoxoidou, 2011; Sobko & Brown, 2021). Nature play fosters physical health

development through games, imagination, jumping, climbing, kicking, and balance (Brussoni et al., 2015). Nature play increases gross and fine motor skills through whole-body activity and drawing or pinching (Sandseter et al., 2020). Nature play creates new opportunities for learning because it allows for a different set of circumstances for children to test out ideas and experiments that are difficult to replicate indoors (Carter, 2016). Nature play allows children to develop self-actualization and risk assessment (Sandseter, 2021). Children can run, climb, jump, etc., outdoors and if they feel unsafe or uncomfortable, they will change their behavior to one that suits their ability level until they are ready to take on more risk (Sandseter, 2021). Nature play can increase learning outcomes for children and give them a mental break to refocus (Gill, 2014). Nature play allows children to engage and connect with the world while providing valuable learning opportunities. The exact time children spend in nature varies for many reasons. The following section will discuss how children spend time in nature or taking part in nature play activities.

Study Measures

In recent years, children's nature play time has decreased as screen time has increased (Clements, 2004; Hofferth & Sandberg, 2001). Market research supports these claims from the organizations OnePoll and Ipsos. OnePoll conducted a survey on behalf of an allergy company of 5,000 parents of children ages 5-13 with an equal distribution for each of the 50 United States and found 57% of parents are worried that their children are not as excited to engage in nature play as children were in the previous generation (Steinberg, 2022). The data revealed that, on average, children spend 5 hours a week outside, yet kids in Alaska, Arizona, Missouri, North Dakota, and Wyoming spend 6

hours a week outside (Steinberg, 2022). Ipsos completed a global market research study in 2018 for a leading footwear and apparel manufacturer on Nature Play for families worldwide (Wheeler, 2018). The study surveyed caregivers of kids ages 3-12 in the U.S., Canada, Germany, and Norway (Wheeler, 2018). Results were reported from 2,002 U.S. and Canadian women 24 years and older on their unique play patterns as kids, as well as their children's current nature play activities (Wheeler, 2018). The survey revealed that American children spend 35% less time engaged in nature play than their parents did as children (Wheeler, 2018). The primary reasons for not engaging in nature play were overscheduling and weather concerns (Wheeler, 2018). Dodd and colleagues (2021) completed a survey of British Children's Playtimes in April 2020. The survey connected with 1,919 caregivers of children ages 5-11 who reported that, on average, children spend about three hours a day playing and only half of that time participating in nature play (Dodd et al., 2021). Understanding how much time children spend engaged in nature play is essential to evaluating caregivers' perceptions of the safety and benefits of nature play.

It is even more critical now for children to spend time outdoors and connect with nature in a safe environment in order to build foundational skills. Throughout the study, nature play, or nature engagement, is defined as child-led play where children observe and interact with natural elements in the Sonoran Desert. Nature play will look different for each child because it is their own unique connection to nature. Nature engagement could look like a child watching ants walk, playing with water, or collecting plants and making a concoction. The study was designed to provide caregivers with the tools and

knowledge to feel more confident in their children's nature play activities and increase children's time spent outdoors.

In regards to nature play in the Sonoran Desert, some are overly cautious and others are incautious. Early research cycles indicate most participants are overly cautious of their children's play behaviors in the Sonoran Desert. Perceptions of nature play in the Sonoran Desert is defined as the ability to become aware, understand, and interpret engagement with natural objects and elements in the Sonoran Desert. The Sonoran Desert is often seen as unsafe due to the abundance of venomous insects, animals, and plants (U.S. Department of the Interior, n.d.). Changing these perceptions through exposure to information about how to engage safely, participants will hopefully see the Sonoran Desert as no more dangerous than other natural environments. Although nature play is beneficial to children, not all communities equally access nature (Beery, 2020). Perceptions of nature play impact caregivers and children's time engaging in those activities, and socioeconomic status plays a role in those perceptions.

Socioeconomic Status and Nature Engagement

Socioeconomic status (SES) directly affects how different communities engage with nature. Research has indicated that lower SES communities are more likely to spend less time outdoors than their peers from higher SES areas (Delisle-Nystrom et al., 2019). Another study indicated that lower SES communities were more likely to have greater media access in their bedrooms and less access to play equipment compared to higher SES communities (Tandon et al., 2012). In the same study, parents were more likely to watch media with their children than their higher SES counterparts. Lower SES communities were more likely to exhibit sedentary behavior and less physical activity

than higher SES communities (Tandon et al., 2012). Another study indicated that regardless of race, ethnicity, and SES, experiences in nature influence the development of lifelong environmental attitudes and values (Strife & Downey, 2009). When considering urban planning, natural spaces are often left out or deemed less important than other factors (Veitch et al., 2006). Access to nature is essential for developing empathy toward it (Lumber et al., 2017). The study will reach different SES communities through targeted social media ads. Through these targeted ads, the research will illuminate any issues or areas of limited access to nature, or perceived limited access to nature, to assess if the intervention has a differential impact on SES communities.

Conclusion

Constructivism supports the intervention's delivery process; participants will be exposed to information through social media and encouraged to integrate messages on nature safety and benefits into their understanding of the environment around them and their children. Participants used the ELT process to continually evaluate and integrate new information into their existing frameworks. It is hoped that this new information will help caregivers re-evaluate their comfort level with their children playing in the natural environment. ELT also supports the content of the intervention because it allows participants to gain valuable experiences to apply to real-life situations. The literature on safety issues in natural spaces and the benefits of nature play supports the content provided to study participants. Knowing the benefits of outdoor play should allow caregivers to make informed decisions in order to engage their family with nature. There is still risk in nature play, but the risk is necessary to learn and grow.

The study seeks to understand how caregivers' perceptions of nature (safety and benefits of nature play) change due to the intervention and its resulting impact on their children's ability to connect with nature. The literature supports using social media to distribute information on the safety and benefits of nature play. Understanding how SES impacts children's ability to connect with the Sonoran Desert is essential to create future interventions to support different communities' needs. No two communities are the same, and they need different experiences to build connections to nature and understand the benefits of nature play. The intervention is using an online or web-based format. Employing this format is essential to provide greater access to the content for numerous communities. Future cycles of research will rely on this intervention method.

CHAPTER 3

METHODOLOGY

The study utilized a mixed methods action research design. Using qualitative and quantitative data and analysis provided a holistic perspective of the change created by the intervention and the context of how the change happened. Ivankova (2015) uses existing definitions of mixed methods and “highlights the use of both quantitative and qualitative data, as well as meaningful integration of quantitative and qualitative methods within a study to generate conclusions about the research problem that are more credible and more persuasive” (p. 5). The mixed methods approach is relatively new to social science research, and it has made a profound contribution to the field of education. This study utilized an action research approach. Action research assists a practitioner with creating systems to evaluate the effectiveness of new innovations or interventions within a particular setting to improve their practice. Mertler (2019) defines action research as:

...any systematic inquiry conducted by teachers, administrators, counselors, or others with a vested interest in the teaching and learning process or environment for the purpose of gathering information about how their particular schools operate, how they teach, and how their students learn. (p. 5)

By utilizing an action research approach for the study, a more robust picture of the impact of a campaign on the safety, risk, and benefits of nature play was explored.

The intervention of this study was delivered online, and a pre- and post-intervention survey with 11 participants and semi-structured interviews with four participants gathered more in-depth information on their experience with the intervention and any changes in their perceptions of safety, risk, and benefits of nature play. The

intervention used infographics on Instagram to engage diverse audiences in perceptions of safety, risk, and benefits of nature play in the Sonoran Desert.

Study Setting and Participants

The study was conducted on Instagram. A social media account was created with the name nature_play_sonorandesert, and the infographics and other content related to the study were posted. The goal was to engage a wide range of socioeconomic (SES) groups. The SES groups were split by those with an annual household income of less than \$79,999 a year and \$80,000 or more. Caregivers, 18 and over, who live around the Phoenix Metropolitan area and have children between the ages of 6-12, were recruited. Initially, the study engaged 13 participants who signed consent forms. However, two of the participants dropped out of the study. Caregivers were purposefully broadly defined so as not to exclude any group and were defined as a family member or paid helper who regularly looked after a child's play and learning experiences. Due to the intervention employing virtual platforms, participants were limited to those with social media accounts and regular access to the social media accounts for the study. Participants were asked to engage with the account three times a week. They had access to a physical location of a natural space (whether on their property, locally at a park, or other natural space) and had the necessary available time to participate. Natural space was defined as a natural, semi-natural, or planted space and included plants, animals, and other features and products of the earth. The goal was to understand caregivers' perceptions concerning the safety, risk, and benefits of nature play and their children's time in natural spaces.

The study recruited 11 participants that have Instagram accounts. The participants were recruited through one month of priming posts on the intervention Instagram

account. After the month of priming posts, the Instagram account asked those who followed the account to participate in the six-week-long study. The recruitment posts lasted one month. A total of two months were spent connecting with potential participants before the participants agreed to join the study. Once the participants identified themselves through a private message to the intervention Instagram account, the researcher ensured they met the study criterion. Participants were asked to review and sign the consent forms. Before the study started, they completed the pre-intervention survey to build a baseline reading on their and their children's current engagement with the Sonoran Desert. Participants agreed to engage with the intervention Instagram account three times a week for six weeks. After the initial message to the intervention Instagram account, most communication was through Instagram messenger and email. The researcher tracked all comments and data throughout the study. Participants were sent follow-up messages or emails to complete each task throughout the study. The researcher had a particular role in the study, which was to engage with the participants and collect and analyze the data.

Role of the Researcher

The researcher took on the role of participant-observer of the study. Given (2008) notes:

Participant observation is a method of data collection in which the researcher takes part in everyday activities related to an area of social life in order to study an aspect of that life through the observation of events in their natural contexts.

(p. 1)

Employing a participant observation method fostered a deep understanding of how participants perceive the safety, risk, and benefits of nature play in the Sonoran Desert. The researcher recruited participants via the Instagram platform. The researcher connected with accounts that shared similar interests to recruit participants to the account. The researcher contacted the account holders to ask if they would share the account with their followers to increase the connections between the two networks. The researcher connected with related accounts and other networks to increase enrollment (see Appendix G).

The researcher participated in the intervention creation while engaging the participants on the platform. Each week followed a similar format of asking participants for their perspectives on that week's theme. The researcher would ask probing questions to the participants as answers came into the account. The researcher would address each comment with a response or a like. Engaging the participants in this manner, the researcher became a participant due in part to their ability to build on the presented information while allowing the participants to engage more deeply with the content. As the participant-observer, the researcher collected information and analyzed the data for the pre- and post-intervention surveys, intervention data, likes, comments, shares, and semi-structured interview data.

Intervention/Innovation

The intervention utilized Instagram to engage participants. The social media plan and strategy were based on best practices. Pope and colleagues (2009) recommend that for any marketing strategy to be successful, it should be easy to implement and straightforward, with easy ways to assess engagement and other metrics. Along with an

easy and clear marketing strategy, Li and colleagues (2020) recommend that the customer or the Instagram user should be the central focus to build engagement and sustained usership with the account. Bernardi and Alhamdan (2022) noted the benefit of utilizing hashtags in social media posts due to their ability for users to connect with content that is specific to that search. Bernritter and colleagues (2016) recommend utilizing warmth or positive communication, as it directly impacts users' desirability to share and endorse the content on social media platforms. Other scholars suggest that a social media strategy should engage audiences to develop a bigger picture of how different groups, organizations, and people connect to the content on the platform (Klassen et al., 2018; Shahbaznezhad et al., 2022). Utilizing best practices in social media planning was intended to set up the study in a way that would support addressing the research questions. Along with these recommendations, understanding the mobilization of users to achieve a goal over a period of time was essential to the social media strategy and plan.

Social media mobilization impacts the social media plan as it allows users to connect to the account in a faster period of time than compared to other methods of engagement. Wang and colleagues (2015) discuss the effects of social media on social mobilization to increase the number of participants in order to achieve a goal in a faster amount of time when compared to email. Chen and colleagues (2021) evaluated the impact of social media on large-scale mobilization efforts. The study indicated that users were more likely to share content and mobilize those in their networks than those outside of it (Chen et al., 2021). Social mobilization should encourage the audience to connect with the action and then take action. The social media strategy for this research utilized

these recommendations to build an audience for nature play and engage them through different types of social media posts.

The social media strategy for the research project identified an audience, posted regularly, engaged users, connected with other relevant accounts, utilized hashtags, created visually appealing content, offered value, monitored the posts' analytics, and adjusted the strategy as needed. The identified audience was caregivers at least 18 years old or older of children between the ages of 5-12 and living in or around the Phoenix Metropolitan area. The account posted once every other day, then adapted to posting once daily to build engagement and grow the account followers. The researcher connected with the relevant users to engage them in questions and discussions around various topics on nature play in the Sonoran Desert. The researcher connected with similar organizations to cross promote material to build followers and potential participants for the study. Each post utilized different hashtags to allow users to find the account easily. Some examples of the hashtags used are #sonorandesert, #arizona, #desert, #nature, #cactus, #desertlife, #az, #saguaro, #phoenix, #explorearizona, #flowers, #outdoors, #adventure, #explore, #natureplay, #learning, etc. The content created for the account utilized images of the Sonoran Desert and asked engaging questions and prompts so the users would connect with the account. The account offered educational tips and resources during the intervention period, and the researcher tracked and monitored the account analytics to adjust the social media strategy.

To recruit participants to the social media account, the researcher created and posted several "engagement posts" to generate interest in the account for one month. An example of an engagement post involved showing pictures of the Sonoran Desert and

asking followers of the channel to participate by answering some questions about the pictures, such as what plants they notice. After the engagement posts, there were explicit recruitment posts to the account followers to build the study sample for one month. The explicit recruitment posts asked followers to connect with the account using similar engagement-style posts. The recruitment posts were boosted with paid ads to have a greater reach to connect with different SES groups. Building a foundation of Instagram users was essential to engaging and recruiting participants to the study.

The engagement posts might have been biased towards groups already engaging with nature. The intention was to create a platform accessible to all levels of comfort with nature. The posts were shared with different groups with overlapping interests to ensure that the study connected to groups that might have had an interest in the account once it was shared with them through someone they trust. Through providing the engagement post associated with the study (but not about safety, risk, or benefits of nature play) participants started to develop an understanding of the Sonoran Desert as a landscape, along with the challenges and opportunities it provides. After two months, participants were asked if they wished to participate in the study. After participants signed a consent form, each was asked to complete the pre-intervention survey. Participants then engaged in six weeks of content on the social media account. The participants were exposed to different topics surrounding the themes of the study: safety, risk, and benefits of nature play in the Sonoran Desert. To support the engagement and intervention process, themes for each week of the study were created that aligned with the research questions.

Aligning with best practices for a social media strategy, the research account grouped each week by themes. The themes of the study, safety, risk, and benefits of

nature play in the Sonoran Desert were addressed at different weeks throughout the study (Table 1).

Table 1

Weeks of Intervention and Themes

Category	Topic
Week 1	Fears of the Sonoran Desert
Week 2	Time Spent Outside
Week 3	Benefits of Nature Play
Week 4	Safety in the Sonoran Desert
Week 5	Nature Play Activities and Spaces
Week 6	Reflections

The format of the posts was an information or poll post on Monday, a question and/or comment post on Wednesday, and an idea and/or comment post on Friday. For example, one week of the study presented information on fears of the Sonoran Desert. It provided statistics on caregivers not allowing their children to play outdoors on Monday, asked them to answer a question on their fears on Wednesday, and then asked for their ideas about their fears on Friday. The participants commented on their fears about allowing their children to engage with the Sonoran Desert through play (see Appendix B).

The information for each infographic for the intervention came from a myriad of sources. Sources were from academics, government, and best practices for safety from city, state, and national parks (see Appendix F). Infographics are the primary conveyors of information to the participants. The infographics were created to support knowledge acquisition and build upon past experiences. See Appendix C for the infographics used for the study.

Measures

The study employed pre- and post-intervention surveys. The survey questions were adapted from similar safety, risk, and nature play studies. The first study by Brussoni and colleagues (2021) used a randomized control trial design and recruited over 400 mothers of children between ages 6-12. The study utilized a risk-reframing workshop to guide participants through the digital tool. The primary outcome supported the Tolerance of Risk in Play Scale (TRiPS) measure, evaluating a behavior change model from social cognitive theory that supported the intervention and goal attainment for the participants (Brussoni et al., 2021). TRiPS was psychometrically validated (Hill, 2014). Sandseter's six categories of risky play provided the base model for the questions in TRiPS (Sandseter, 2009). The scale had a goodness-of-fit test within the acceptable range (Hill, 2014). TRiPS has a Person Reliability Index of 0.87, which supports the instrument's ability to consistently distinguish between high and low scores (Brussoni et al., 2021).

The risk reframing intervention utilized Social Cognitive Theory (SCT) that supported the Behavior Change Model (BCM) by other scholars (Niehues et al., 2016; Bundy et al., 2011; Bandura, 2001; Michie et al., 2013). The BCM utilized various methods and surveys to frame and reframe behavior changes (Brussoni et al., 2021). The BCM was assessed using confirmatory factor analyses and psychometrics, which provide a strong confidence interval for each item for the three constructs, self-efficacy, outcome expectations, and knowledge of risky play (Brussoni et al., 2021). The behavior change model was tested using mediation analysis for the intervention utilizing Whittle and colleagues' (2016) suggestions. The steps in the mediation analysis provided a decision

model for who was included in each group, control, or intervention (Brussoni et al., 2021). Goal attainment was evaluated using a behavior change questionnaire (Brussoni et al., 2021). Due to the lack of significant intervention effects for goal attainment, mediation analysis was not utilized (Brussoni et al., 2021). Portions of the validated items from the behavior change questionnaire were utilized in the pre- and post-intervention survey due to its ability to provide valid and reliable results.

Other questions were utilized from Loebach and colleagues (2021) for the pre- and post-intervention survey. The study focused on nature play supported by adults and was focused on independent activity in local neighborhoods of different social, cultural, and environmental factors that might impact children's outdoor and community play activities (Loebach et al., 2021). The study used a convenience sample of students in 6th through 8th grade, as well as their parents in 12 elementary schools across the Ontario region of Canada. The survey asked for demographic information, home setting, children's access to and use of home and community outdoor spaces, time outside with and without adults, and time spent on screens or devices (Loebach et al., 2021). Demographics were based on urban, suburban, and rural areas, population density characteristics, road density, housing types and density of the school's region (Loebach et al., 2021). Over 2000 surveys were distributed to the students (Loebach et al., 2021). Each model was controlled with all demographic variables, and a regression analysis using multivariate models and random intercept controls was employed to show the validity and reliability of the data (Loebach et al., 2021). The model diagnostic analysis provided normality and homogeneity of the variance, and any outliers and influential diagnostic measures were assessed (Loebach et al., 2021). Based on the statistical analysis results, the survey provided reliable and valid

results. Questions related to demographics and time spent outside from the nature play study survey were included in both the pre- and post- intervention survey. See Appendix D for both the pre- and post-intervention survey questions.

The semi-structured interview questions were written based on this study's research questions and alignment with TRiPS, behavior change, and nature play caregiver surveys. Along with considering the themes and the questions in the pre- and post-intervention survey, the semi-structured interview questions were created to validate and build a rich description of the actions taken by the participants in the study. The semi-structured interview questions were assessed for accuracy through review by two independent parties that did not participate in the study. The semi-structured interview questions were double-coded at 20% to assess inter-rater reliability and improve the reliability of results. See Appendix E for semi-structured interview questions.

Data Collection Procedures

The mixed-methods study employed quantitative and qualitative data collection and analysis measures. The quantitative instruments included a pre- and post-intervention survey. The survey was distributed through Google Forms to keep responses confidential but employed a naming convention to link the pre- and post-intervention survey responses (see Appendix D). The frequency of likes and shares of intervention materials were also tracked on Instagram as a quantitative measure of participant engagement. See Table 3 below for a breakdown of the research questions, data sources, and analysis strategy. Quantitative data were analyzed at the end of the data collection process.

Qualitative data included open-ended survey questions on the pre- and post-intervention surveys and an analysis of comments on the intervention materials presented

on Instagram. In addition, four participants of the total 11 were part of a randomly selected sub-sample through a randomized number generator based on SES divided between higher and lower. Each of the four participants was asked to complete semi-structured interviews. Data from the semi-structured interviews, open-ended survey questions, and Instagram comments were coded using thematic analysis. Qualitative data from the study were analyzed at the end of the data collection process.

Data Analysis

A convergent parallel design using quantitative and qualitative methods was used to answer the study research questions. Crestwell and Guterman (2019) note:

A basic rationale for this design is that one data collection form supplies strengths to offset the weaknesses of the other form and that a more complete understanding of a research problem results from collecting both quantitative and qualitative data. (p. 551)

Employing the convergent parallel design produced a more robust story to illuminate the data. The quantitative data were analyzed using basic repeated measures statistics for the pre- and post-intervention survey and frequency counts of likes and shares on Instagram. Construct scores were calculated using the total sum of all component items within the construct (see Appendix J for all construct items). Analysis of the themes of safety, risk, and benefits of nature play was derived from the total scores of the constructs (see Table 2).

Table 2

Item Constructs for Risk, Safety, and Benefits of Risky Nature Play

Risk Perceptions

- 12 items on a 1–5-point Likert Scale for a total possible score of 60
- Higher Score indicates caregivers are more comfortable with risky nature play
- Lower score indicates caregivers are less comfortable with risky nature play

Comfort With Nature

- 8 items on a 1-4 Likert Scale for a total possible score of 32
- Lower score indicates caregivers have less concerns with risky nature play
- Higher Score indicates caregivers have more concerns with risky nature play

Benefits of Risky Nature Play, My Child

- 10 items on a 1-5 Likert Scale for a total possible score of 50
- Higher Score indicates caregivers are more aware of the benefits of risky nature play
- Lower score indicates caregivers are less aware of the benefits of risky nature play

Benefits of Risky Nature Play, Any Child

- 10 items on a 1-5 Likert Scale for a total possible score of 50
 - Higher Score indicates caregivers are more aware of the benefits of risky nature play
 - Lower score indicates caregivers are less aware of the benefits of risky nature play
-

For each of these constructs of risk and benefits of risky nature play, the lower the total score indicates participants were averse to that item while the higher the total score indicates being more willing to engage in that item. For the safety construct (in the table noted as Comfort with Nature), the lower the score, the less concern caregivers had, and the higher the score, the more concern caregivers had. The quantitative and qualitative data analysis employed in the study was intended to bring a rich story of the participants' experiences with nature play in the Sonoran Desert.

The qualitative data were analyzed using thematic analysis. Vaismoradi and colleagues (2013) describe thematic analysis as finding meaning across a data set to support the interpretation of the information. Xu and Zammit (2020) suggest six steps in the thematic analysis process: familiarizing the data, creating initial codes, searching for themes, reviewing and revising themes, defining and naming themes, and producing the final codes. Peel (2020) suggests a similar approach for the thematic analysis of qualitative data with six steps: collecting, engaging, coding, creating code categories, conceptualizing themes, and contextualizing and representing the data. Qualitative data coding can take many forms, but this study utilized a specific format detailed below.

Saldaña (2021) discusses the qualitative coding process employed in the analysis process. In vivo coding is the literal coding of the terms participants use (Saldaña, 2021). Code landscaping employs text and visual representations of the frequency of words to assess their frequency in qualitative coding (Saldaña, 2021). Theoretical coding is a process in which all similar themes and ideas are systematically integrated around the central category or code, like risk, safety, and the benefits of nature play (Saldaña, 2021). In vivo coding was initially used. Next, code landscaping was used to derive the code categories. Then, thematic coding was implemented to derive the final codes. Finally, a thematic analysis of the codes was implemented to analyze the codes. The data were coded, and themes of safety, risk, and benefits of nature play emerged. As each theme emerged, the researcher considered the relationship throughout all the categories. Through this process, the data continued to connect to its source, leading to a case-based generalization of the data. The codes were assessed based on their connection to each other and the context-specific safety, risk, and benefits of nature play in the Sonoran

Desert (Given, 2008). See Table 3 for the data analysis strategy for each research question.

Table 3*Analysis of Research Questions, Source and Plan*

Research Questions	Data Source	Analysis Plan
If participants were informed of safety and concepts of nature play, would their perceptions change and did participants' interactions with nature change?	Pre- & /Post- Intervention Survey	A paired samples t-test was conducted on survey items about perceptions and actual interactions with nature.
	Participant Comments and Interviews	Thematic analysis of interviews and comments looked for themes around perceptions and interactions with nature. Participants were separated into high and low SES groups (above and below the mean for the entire sample). A paired samples t-test was run to compare changes in caregiver perceptions and engagement with nature between these two groups.
How and to what extent did socioeconomic status influence the way that caregivers perceive and engage with nature play as a result of the intervention?	Pre- & Post-intervention Survey	An independent samples t-test was used to compare changes in caregiver perceptions and engagement with nature between the two groups.
	Interviews	Thematic analysis of interviews looked for themes around perceptions and interactions with nature separated by High and Low SES.
	Post Survey Responses	A paired samples t-test was conducted on survey items about perceptions and actual interactions with the intervention.
How and to what extent did participants engage and find the intervention useful?	Instagram likes, comments, and shares	Descriptive statistics was used for Instagram likes, comments, and shares to show engagement trends over time.
	Participant comments and interviews	Thematic analysis examined themes related to participants' impressions of each aspect of the intervention.

The qualitative data were analyzed using thematic coding. The pre- and post-intervention survey used thematic coding of open-ended questions. Given (2008) notes:

Thematic coding is the strategy by which data are segmented and categorized for thematic analysis. Thematic coding is a strategy of data reduction, in contrast to the axial and open coding strategies characteristic of grounded theory research, which enrich and complicate data through the inclusion of analytic insights and inquiries used. (p. 1)

The coding scheme employed generated themes and categories to organize and analyze the data. Employing a mixed methods approach fostered a deeper understanding of the participants' experiences with safety, risk, and benefits of nature play in the Sonoran Desert.

Timeline

The study took place from August through September 2022. In May 2022, the study obtained IRB approval and engaged potential participants through a month-long priming period of social media posts. In July and August 2022, participants were recruited during a month-long recruitment period. They completed the consent form and then took the pre-intervention survey on their perceptions of the safety, risk, and benefits of nature play in the Sonoran Desert. The pre-intervention survey was administered by Google Forms before the web-based intervention started, and 13 participants completed it. From August through September of 2022, intervention content was posted three times per week on Instagram on Monday, Wednesday, and Friday for 6 weeks. During this time, comments, likes, and shares were recorded every Tuesday, Thursday, and Saturday, 24 hours after the post from the day before. In October 2022, the post-survey and 4 semi-

structured interviews were completed. The post-intervention survey was administered by Google Forms; 11 participants completed it. Four participants were asked to participate in semi-structured interviews conducted via Zoom. These interviews were only audio recorded with the participants' permission. Two participants were randomly selected above and below the average household income of \$80,000 annually. The data collected for the semi-structured interviews were based on lived experiences of caregivers and their children engaging in nature play in and around the Phoenix Metropolitan area and caregiver interactions with the web-based intervention on Instagram. Data were analyzed from October 2022 through January 2023, and the results and discussion were written. See Table 4 for a complete breakdown of the study timeline.

Table 4

Timeline

Date	Action
May 2022	IRB approval, recruit participants
June to August 2022	Recruit participants, consent completed, administer pre-survey
August to September 2022	Intervention delivery: 6-week information campaign, data collection from online engagement with the information
October 2022	Post-survey, interviews
October 2022 to January 2023	Data analysis, write up

Conclusion

The study sought to improve the perceptions and engagement of caregivers and their children in nature play in the Sonoran Desert. At the end of the study, the

participants reported some behavior change, shared information on ways to engage with the Sonoran Desert safely, and created a space that supports nature play for their children. The study highlighted the participants' stories and added to the current literature on nature play and environmental education. Future studies could be developed based on the results of this study.

CHAPTER 4

RESULTS

Three research questions were explored using quantitative and qualitative data collected from participants in surveys, online posts, and individual interviews.

- RQ 1: If participants were informed of the safety and benefits of nature play, would their perceptions and their children's interactions with nature change?
- RQ 2: How and to what extent did socioeconomic status influence the way that caregivers perceived and engaged with nature play as a result of the intervention?
- RQ 3: How and to what extent did participants engage in and find the intervention useful?

Eleven participants were included who lived in or around the Phoenix Metropolitan area. Nine participants had two children, one had four children, and one had eight children. See Table 5 for information on participants' demographics.

Table 5*Demographic Information*

Category	M(SD) or % (N)
Primary Caregiver	
Yes	81.8% (9)
Shared Custody	18.2% (2)
Gender	
Female	81.8% (9)
Male	18.2% (2)
Current Age	40.91 (4.12)
Ethnicity	
White	90.9% (10)
LatinX	9.1% (1)
Education Achieved	
High school graduate	9.1% (1)
Attended college but did not complete degree	9.1% (1)
Completed associate's degree	9.1% (1)
Completed bachelor's degree	27.3% (3)
Completed master's degree	27.3% (3)
Completed doctorate degree	18.2% (2)
Annual Household Income	
Between \$50,000 and \$59,000	27.3% (3)
Between \$70,000 and \$79,999	18.2% (2)
Between \$80,000 and \$89,999	9.1% (1)
Between \$90,000 and \$99,999	9.1% (1)
\$100,000 or more	36.4% (4)

Only two (18.2%) participants reported living in Arizona their whole life. Two (18.2%) reported living in Arizona for a year to two years, and the other seven (63.6%)

participants reported living in Arizona between 10 to 20 years. Most (63.6%) participants also reported residing at their current address between 5 to 10 years, with two (18.2%) reported residing at their current address for two years or less. Two (18.2%) reported living at their current address for 11 or more years.

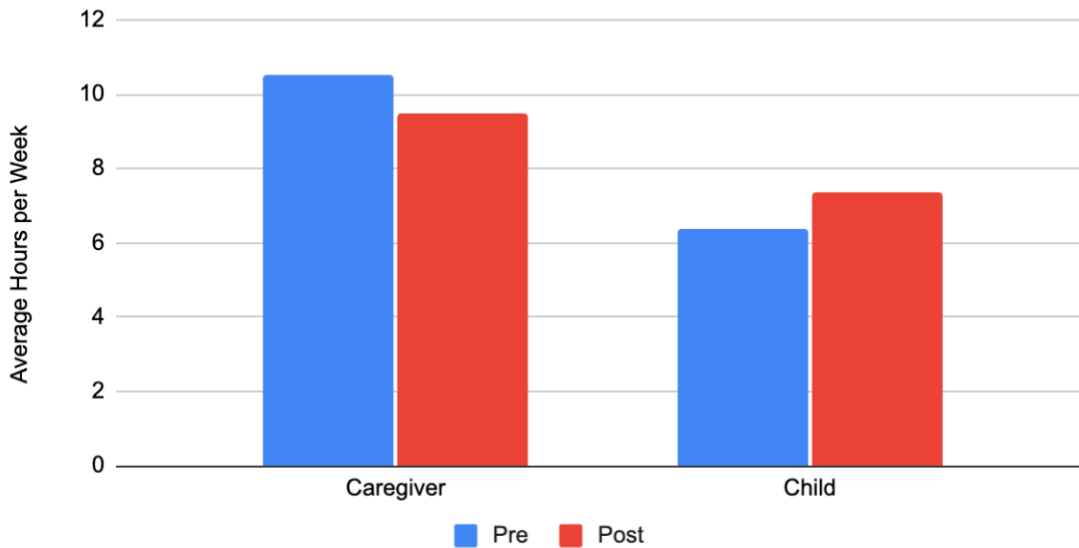
Data was collected from a pre-intervention survey, post-intervention survey, social media posts on Instagram, and semi-structured interviews. The study aimed to build on the literature of nature play and develop a foundation on the perceptions of safety and risk in the Sonoran Desert when caregivers' children are engaged in nature play.

Research Question 1: Did perceptions of nature change?

Participants were asked how many days a week and the average amount of time they and their children spent outside engaged in nature play during spring, winter, fall, and summer in the pre- and post-intervention survey. The average time outside was calculated by averaging responses of the number of days and amount of time spent outside for caregivers and their children. For example, if a participant reported spending three days outside in an average week and then reported spending about one to two hours outside, that would total six hours per week. Then all of the total time spent outside by participants was averaged by dividing by the number of participants. Figure 2 provides the average time outside for the participants and their children from the pre-intervention to the post-intervention survey.

Figure 2

Average Hours Spent Outside Caregiver and Child Pre-Intervention to Post-Intervention



A paired-samples t-test was conducted to compare caregivers and their children’s average time spent outdoors before and after the intervention (see Table 6).

Table 6

Caregiver and Child Average Time Spent Outside

Category	Pre-Survey M(SD) N=11	Post-Survey M(SD) N=11	Sig.
Caregiver Average Time Spent Outside	10.52 (6.19)	9.61 (4.68)	0.384
Child Average Time Spent Outside	6.38 (5.03)	7.36 (6.42)	0.591

*p < .05. **p < .01. ***p < .001

Even though changes in the average reported time outside for caregivers and children were not significant, it was consistent with study expectations. Before the intervention, caregivers were spending slightly more time outside compared to after engaging with the

intervention. In comparison, children were spending slightly more time outside after the intervention compared to the pre-intervention survey.

During the intervention, all Instagram users on the page were asked to report on their children's time engaged in nature play during the year. Twelve users, some participants, and other Instagram users reported that their children spent at least 1 hour engaging in nature play daily. Instagram users were also asked to report on their time spent outdoors. Seven users reported spending at least one hour outdoors a day. So, the reported average time outside for caregivers and children on Instagram was approximately 6-7 hours a week, consistent with participant responses from the surveys and interviews for their children.

After the intervention, four participants were asked in semi-structured interviews about their and their children's time spent outdoors. The responses from participants were grouped into the theme of time outside (see Table 7).

Table 7

Themes of Outdoor Time for Caregivers and Children

Code Themes	Description	Frequency Count	Example Quotes
Time Outside	Amount of time spent outside, child	16	My children probably spend more time outside than some of their peers. They're getting out in nature at least two times a week.
	Amount of time spent outside, caregiver	18	I probably would say an hour to three a day. [sic] I will go outside constantly for sure, on average, probably like, seven days a week at least two to three hours a day.

All participants reported they and their children spent time outdoors, but they generally spent more time outdoors than their children.

Four constructs were created to assess caregivers' perceptions and their children's interactions with nature. The constructs were risk, safety, the risky nature play categories for any child, and the risky nature play categories for their child set forth by Sandseter (2007). Caregivers reported their perceptions about children in general and then perceptions about their own children. Each of the constructs was created using scores from different questions (risk perceptions, a total of 12 questions; safety perceptions, a total of eight questions; benefits of nature play for any child, a total of 10 questions; and benefits of nature play for my child, a total of 10 questions) on the pre- and post-intervention surveys using Likert scale questions from 0 to 5 or 0 to 4, depending on the question, to create a total score for the construct. Then a paired-samples t-test was conducted for all constructs (see Table 8). A p-value of .05 was used to determine significance.

Table 8

Caregiver Perceptions of Safety, Risk, and Benefits of Nature Play

Category	Pre-Survey M(SD) N=11	Post-Survey M(SD) N=11	Sig.
Risk Perceptions	23.00 (10.80)	22.63 (7.48)	0.892
Safety Perceptions	13.18 (4.28)	14.09 (3.36)	0.526
My Child Risky Nature Play	36.45 (4.94)	36.90 (4.70)	0.096
Any Child Risky Nature Play	36.54 (5.10)	37.27 (4.40)	0.316

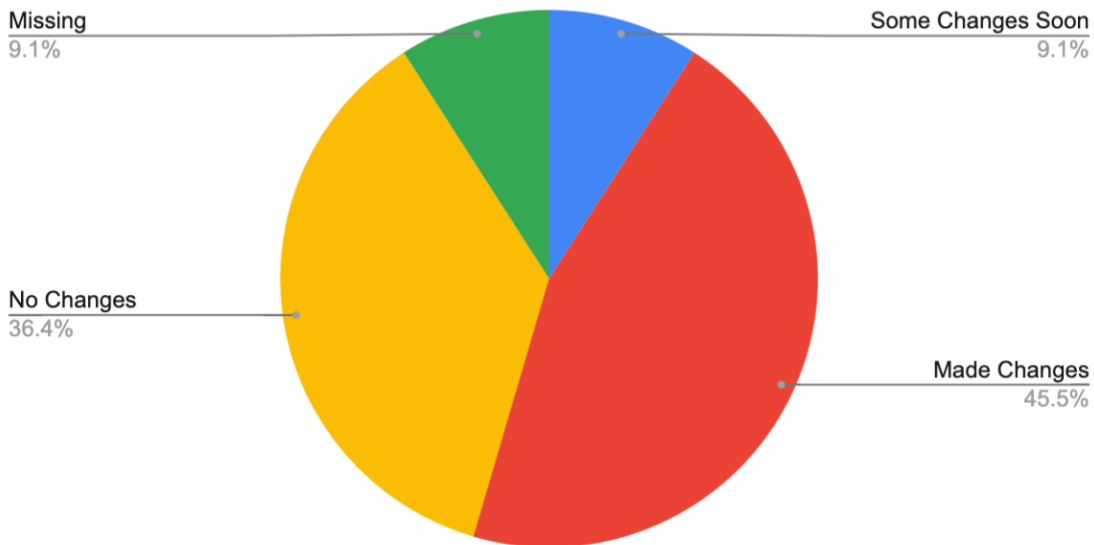
*p < .05. **p < .01. ***p < .001

A paired sample t-test was conducted to compare perceptions of risk in the Sonoran Desert before and after the intervention by caregivers. There was no significant difference in the scores for the pre-intervention total scores and the post-intervention total scores.

In the post-intervention survey, participants were asked to report on their nature play behavior changes after participating in the study. Almost 40% of the participants reported they did not make any changes (see Figure 3). However, more than half the sample reported that they had already made changes or would soon make changes to their children's risky nature play activities. Thus, the intervention appeared to have impacted the participants' actions in nature.

Figure 3

Changes in Behavior as a Result of the Intervention



Similar to the surveys, during the intervention, Instagram users were asked if their perceptions of the safety, risks, and benefits of nature play had changed due to the intervention. Themes around perceived changes in nature play are highlighted in Table 9.

Table 9*Themes of Safety, Risk, and Benefits of Nature Play, and Perspectives*

Code Themes	Description	Frequency Count	Example Quotes
Safety in Nature	Tips, ticks, and stories about nature safety	92	I think awareness, the parents being comfortable with it and doing it. [sic] ...cooling towels and handheld mister fans help tremendously.
Nature Play Benefits	Benefits of risky nature play in the Sonoran Desert	87	Being able to learn about our surroundings and being more aware of what's in the surroundings. Was interesting to see the other posts and how to apply it to play. Participating in this study brought the idea of Nature Play to the forefront in my mind, and positively influenced the activities I planned and did with my children.
Risk	Potential of injury to child in a play space	49	There are sketchy people hanging around the parks. Yeah, you can have risk on playground equipment.
New Nature Play Perceptions	Change in perspective due to the intervention	11	Yes, I know now that I should definitely give my kids the opportunity to play in the Sonoran Desert because it feels just as safe as any other place they would play outdoors. And it would give them so many new experiences! I realized that of all the injuries my kids and their friends [have had] that have required an ER or urgent care visit, so often resulted from playing on standardized playground equipment. Falling from monkey bars results in a lot of broken arms! While injuries can happen while playing in the Sonoran Desert, we've been lucky enough to not sustain any major injuries while spending time in nature.
Not Change Behavior	Already comfortable	4	I don't think that clearly changed any of my perceptions, but more so. Um definitely validated them ...probably not a lot just. [sic] I was already fairly comfortable with it.

Participants reported on Instagram posts that as a result of the intervention, they were more likely to allow their children to engage in nature play in the Sonoran Desert. Participants reported realizing that the traditional safe places to play (like playgrounds) could cause more severe harm to children than nature. They also reported realizing that nature provided their children with greater learning opportunities than traditional indoor play and playground structures. The intervention changed perceptions of nature play's benefits and allowed participants to think more critically about their children's playtime and the spaces they played in.

During the semi-structured interviews with four participants, they indicated little change to their usual play activities since they were already very engaged in nature play with their children. These codes were grouped into a “no change in nature play perceptions” theme. The reasons for not changing their behavior were primarily because they reported feeling comfortable and spending time in nature with their children in the Sonoran Desert already. However, participants did indicate that it was helpful to be reminded of the benefits of nature play and different safety aspects for the Sonoran Desert. Participant A noted, “I felt validated by your points. I know that's not as important to many people, but for me it's nice to not just be given the like piece of information but, in this study, you know, supports this.” Participant B mentioned, “all of this stuff that was shared are things that I already practice like, what not to do out in nature, and you know, I don't think that clearly changed any of my perceptions, but more so validated them.” Even though participants' perceptions might not have changed, they saw the benefit of the content on Instagram. They felt their ideas were validated enough to share the information with others in their community.

Research Question 2: Did socioeconomic status influence participants' experience in the intervention?

Pre- and post-intervention survey data and thematic analysis of the semi-structured interview data were used to answer this question. To assess socioeconomic status (SES), the average household income was used to create a cut score where approximately half the participants were above and half below this score. The cut score was \$80,000; five participants were below the cut score, and six were above the cut score. Then a paired samples t-test was run within each of the two SES groups. Comparing the same variables from research question one, risk, safety, and the nature play categories set forth by Sandseter (2007), the groups reported their perceptions about children and nature in general and then perceptions about their children. Then an independent samples t-test was conducted, comparing whether there were differences in the changes in the perceptions of risk, safety, and benefits of nature across the intervention by SES groups.

Area median income (AMI) is utilized by various national and state organizations to provide services to communities that would be considered low SES. For a family of four in Phoenix, having a household income of around \$27,000 yearly is considered extremely low income and most closely linked to the national poverty guidelines of \$30,000 for a family of 4 (Human Services, 2022; U.S. Health and Human Services, 2023). The lower and higher SES groups within this sample do not represent families that would be considered low SES in Phoenix. Similarly, in comparison, the U.S. national poverty threshold (about \$34,000) is also lower than any of the families in the current study (U.S. Census Bureau, 2023), so the families in this study do not represent families that would be considered “low SES” in the U.S., but simply having lower SES than the

“higher” SES group within this participant sample. Utilizing poverty guidelines and poverty thresholds from state and national organizations illuminates the complexity of poverty in the U.S. and Arizona. None of the families in the study would be considered low SES as the number of people in the household and income levels do not place them around the extremely low income or at the poverty threshold level.

Table 10

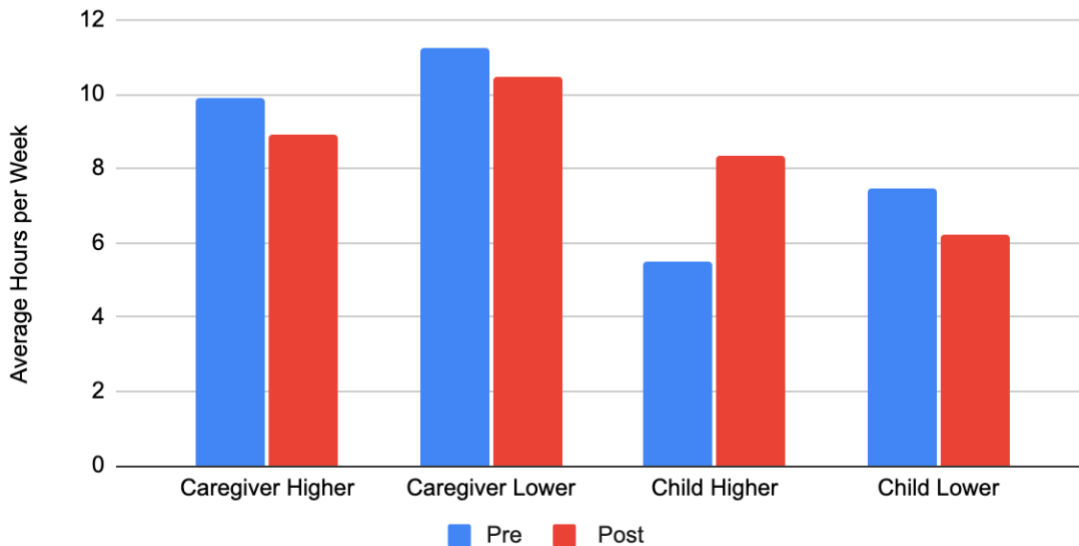
Caregiver and Child Average Time Spent Outside Within SES Groups

Category	Lower SES Group Pre-Survey M(SD) N=5	Lower SES Group Post-Survey M(SD) N=5	Sig.	Higher SES Group Pre-Survey M(SD) N=6	Higher SES Group Post-Survey M(SD) N=6	Sig.
Caregiver Average Time Spent Outside	11.25 (6.61)	10.45 (4.49)	0.648	9.91 (6.38)	8.91 (5.14)	0.501
Child Average Time Spent Outside	7.45 (6.01)	6.20 (9.08)	0.681	5.50 (4.50)	8.33 (3.73)	0.241

*p < .05. **p < .01. ***p < .001

Figure 4

Average Hours Spent Outside Pre-Intervention to Post Intervention



The first paired samples t-test compared caregivers' and child's average time spent outside, from before to after the intervention by caregivers in the lower and higher SES groups (see Table 10). Even though there was no significant difference in the reported average hours outside for caregivers and their children, in both the higher and lower SES groups there was greater time outside before the intervention and a decrease in time reported after the intervention for caregivers, specifically (Figure 4). While not statistically significant, it was surprising (based on previous research) that the caregivers' average time outside was higher in the lower SES group than the higher SES group.

Children's average time outside diverged from the expectations across the course of the intervention, but there were no significant changes for either group. Children in the higher SES group reported fewer hours outside before the intervention and more hours outside after the intervention. In comparison, children in the lower SES group had a decrease in the average time outside over the course of the intervention (Figure 4). A

paired samples t-test was conducted to compare caregivers' perceptions of risk, safety, and benefits of nature play in the Sonoran Desert for any child compared to thinking specifically about their own child. There was no significant difference in the pre-intervention and the post-intervention total scores for the lower SES group (see Table 11).

Table 11

Caregiver Perceptions of Safety, Risk, and Benefits of Nature Play by Lower SES Group

Category	Pre-Survey M(SD) N=5	Post-Survey M(SD) N=5	Sig.
Risk Perceptions	18.20 (11.45)	20.00 (5.52)	0.745
Safety Perceptions	15.20 (2.58)	13.80 (5.11)	0.505
My Child Risky Nature Play	34.60 (6.61)	35.40 (6.30)	0.178
Any Child Risky Nature Play	34.00 (6.74)	36.20 (5.67)	0.086

*p < .05. **p < .01. ***p < .001

There was no significant difference in the scores for the pre-intervention total scores and the post-intervention total scores for the higher SES group (see Table 12).

Table 12

Caregiver Perceptions of Safety, Risk, and Benefits of Nature Play by Higher SES Group

Category	Pre-Survey M(SD) N=6	Post-Survey M(SD) N=6	Sig.
Risk Perceptions	27.00 (9.29)	24.83 (8.65)	0.408
Safety Perceptions	11.50 (4.88)	14.33 (1.21)	0.161
My Child Risky Nature Play	38.00 (2.75)	38.16 (2.85)	0.363
Any Child Risky Nature Play	38.66 (1.96)	38.16 (3.31)	0.409

*p < .05. **p < .01. ***p < .001

Finally, an independent samples t-test was conducted to compare changes across the intervention in caregivers' perceptions of risk, safety, and benefits of nature play in the Sonoran Desert between the two SES groups (see Table 13).

Table 13

Caregiver Perceptions of Safety, Risk, and Benefits of Nature Play Between SES Groups

Category	Lower SES Group M(SD) N=5	Higher SES Group M(SD) N=6	Sig.
Risk Perceptions	1.8 (11.54)	-2.16 (5.87)	0.47
Safety Perceptions	-1.4 (4.27)	2.83 (4.21)	0.13
My Child Risky Nature Play	.8 (1.09)	.16 (.40)	0.21
Any Child Risky Nature Play	2.20 (2.16)	-.5 (1.64)	.043*

*p < .05. **p < .01. ***p < .001

The two groups were only different in their changes in perceptions of the benefits of risky nature play. In the lower SES group, there was significantly more change in caregiver beliefs on the benefits of risky play for any child (M=2.20, SD=(2.16) compared to the higher SES group (M=-.5, SD=1.64; t(9)=2.35, p=.043). However, the higher SES group reported more benefits of risky play from the beginning of the study, before the intervention began. Therefore, that group had less room to grow throughout the intervention.

Four participants were randomly selected from those that completed both the pre- and post-intervention survey and asked to participate in a semi-structured interview. Two were selected from the higher SES group, and two were selected from the lower SES group. Participants A and D were included in the higher SES group, and Participants B

and C were included in the lower SES group. Emerging themes of nature play were identified as benefits and activities that produce those benefits (see Table 14).

Table 14

Themes of Activities and Benefits of Nature Play for SES Groups

Code Themes	Description	Frequency Count	Example Quotes
Nature Play	Activities	18	...we love to climb trees. They kind of get a different perspective of nature up in the tree.
	Benefits	69	It builds confidence. It allows kids to learn how to assess risk. [Children] can kind of test their own limits, and then those limits can change as they grow and get more comfortable being outside. I think that they're learning about their own bodies and their own physical capabilities and limitations.

All participants reported similar perceptions around the benefits of nature play, such as building confidence and assessing risk. Regardless of SES status, all participants reported their children getting some benefit from engaging in nature play that supports their physical and mental development. All participants also reported their children engaging in similar nature play activities, like climbing trees, even though the nature space might have differed. For example, the higher SES group reported camping or spending time in the mountains. In comparison, the lower SES group would engage in nature play activities in places closer to home in parks or backyards. SES did not have a significant impact on participants' perceptions of the benefits of nature play or the nature play activities. The location could change where they would engage in nature play.

Research Question 3: How and to what extent did participants engage in and find the intervention useful?

Research question three was analyzed using post-intervention surveys, thematic analysis of intervention comments, and semi-structured interview data. This question assessed the effectiveness of the delivery of the study content. The post-intervention survey asked participants to rate each week's posts for clarity and information provided. The participants had to rank each week's posts from 0 to 5, with 0 being the information was not helpful to 5 where the information was very helpful. An average score was calculated to compare each week (see Table 15 for each week's average total scores). To assess the effectiveness of each week's posts, a paired samples t-test was used to compare the scores within each week's posts to the next week.

Table 15

Average Ratings of Each Week of the Intervention

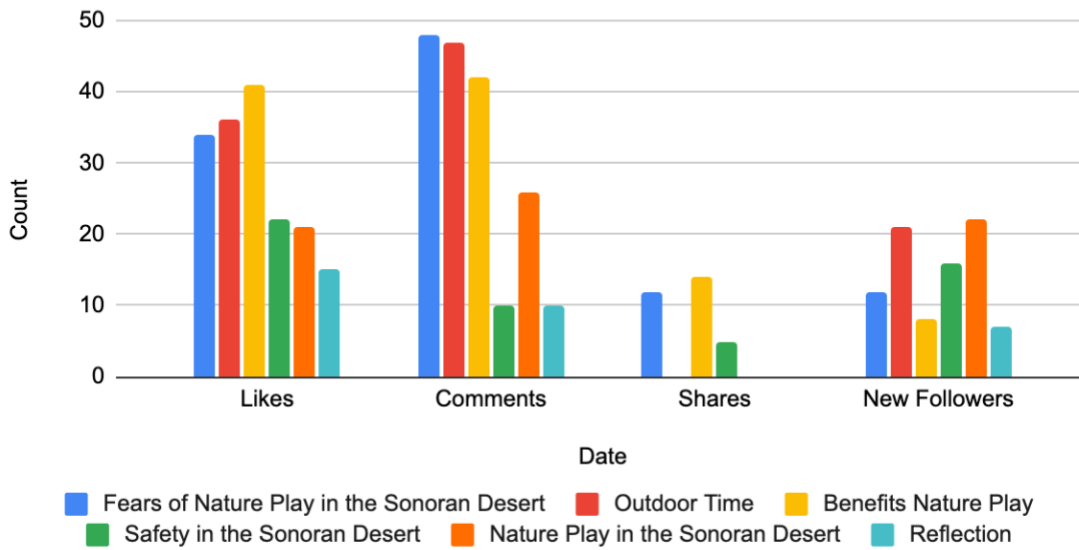
Category	Topic	M(SD) N=11
Week 1	Fears of the Sonoran Desert	4.36 (1.02)
Week 2	Time Spent Outside	4.54 (.82)
Week 3	Benefits of Nature Play	4.45 (.82)
Week 4	Safety in the Sonoran Desert	4.45 (1.537)
Week 5	Nature Play Activities and Spaces	4.36 (1.02)

There were no significant differences in the ratings of each weeks' content. From the average scores for each week, the highest-rated week was the second week, time spent outdoors. The second week asked caregivers how much time they and their children would spend outdoors and to report on their current nature play activities.

Building off of these results, descriptive statistics on likes, comments, and shares of the intervention content were utilized to assess engagement with each week's posts. Week one had the most comments, and week three had the most likes and the most shares (see Figure 5).

Figure 5

Likes, Comments, Shares and New Followers Across the Intervention



Week one asked participants about their fears of the Sonoran Desert. Week three covered information about the benefits of nature play.

During the last week of the intervention, participants were asked to reflect on their experience over the past five weeks of content. Themes were coded into the intervention benefits and intervention improvement themes (see Table 16).

Table 16*Themes of Intervention Benefits*

Code Themes	Description	Frequency Count	Example Quotes
Intervention Benefits	Participants discussed ways that they found the information beneficial	8	I think of your graphics and everything that you did. It was incredible information...
	Enjoyed content	9	The information was definitely well researched on a lot of the stuff. There was different, like sources and citations. I enjoyed the content provided on nature play. Before joining the study, I was already a proponent of nature play, and living in Arizona, the Sonoran Desert is where we play. I think I benefited most from the frequent, yet subtle nudge via your Instagram posts to take my kids out to play more in nature rather than just go to our neighborhood park with standard playground equipment. Yes! The content was a good reminder that I know what I'm doing and so do my kids. Great encouragement to keep getting out there.

At the core of these statements by Instagram participants was the benefit of both the information and the building a community of like-minded people. Participants reported that through feeling validated in their beliefs about the importance of nature play, they were reminded to keep bringing their kids out into nature.

In each of the semi-structured interviews, participants were asked if the content of the intervention was communicated effectively and what they liked about the intervention. These were again coded under the umbrella theme of intervention benefits (see Table 17).

Table 17*Themes of Intervention Benefits, Content and Positive Communication*

Code Themes	Code	Frequency Count	Examples Quotes
Intervention Benefits	Information content	10	<p>I think that the uh information was definitely well researched on a lot of the stuff. There was [sic]differences, like sources and citations and so I thought that that was helpful, that it was presented that way for anyone who wanted to look into some of the stuff a little bit further. And you know the credibility of this information that was shared. I thought that it was also engaging like with the graphics and the pictures and stuff that were shared.</p> <p>A hundred percent, yes, because it just helps people to understand nature a little bit better, and see what other kinds of things that they can actually kind of do in nature. And it's just good for learning purposes.</p>
	Positive Communication	7	<p>I do think so. I think it was. It was great, it was gentle, and it wasn't forceful, and it was sharing information, and not telling people what to do or what not to do, which I think is a very effective way of communicating information.</p> <p>Yeah, I think they were very clear. I liked the little graphics so I often like to take pictures. But the messaging was clear. Um, I'm a data person so like the statistics, I feel like I was able to absorb very readily. I imagine most people would find that effective as well.</p>

Each participant thought the information was communicated effectively through the infographics and positive communication. According to participants, these two content

delivery methods effectively connected the participants to useful and reliable information that they felt was applicable to their lives.

Conclusion

The study addressed three research questions around the safety, risk, and benefits of nature play in the Sonoran Desert. The study did not appear to have a major impact on the perceptions of participants. However, it did validate their experiences and caregiving style. The study also did not appear to have a differential impact on different SES groups. Those who were in the higher SES group could spend more time traveling to engage with nature play in the Sonoran Desert, but there were still interactions with the Sonoran Desert for those in the lower SES group. Participants did suggest that the intervention was engaging and impactful in communicating information via Instagram through infographics and positive messages about nature.

CHAPTER 5

DISCUSSION

This study explored whether caregivers' perceptions of the safety, risk, and benefits of nature play in the Sonoran Desert could be changed as a result of an online social media information intervention. The intervention did not appear to strongly impact participants' views of safety, risk, and benefits of nature play, as there was not a lot of room for growth in these areas among the participants who joined the study. Additional results examined the impact of SES on changes in perception and engagement with the environment and what participants liked and would recommend changing about the intervention. The implications of these results will be explored in detail below.

Findings and Discussion

This social media intervention was created and delivered on Instagram to improve participants' understanding of the safety, risk, and benefits of nature play in the Sonoran Desert. The following discussion will contextualize the results from the study and connect them to the relevant research and theoretical frameworks.

Research Question 1: Did participants and their children's interactions with nature change?

On average, the participants' children spent about 7.5 hours outside in an average week after the intervention, and 6.5 hours before the intervention, which was surprisingly less time outside than caregivers, which was about 9.5 hours at the completion and 10.5 before the intervention. While the children's average time outside increased from the pre-intervention to the post-intervention, and caregivers' time outside decreased after the intervention, none of these changes were statistically significant. The average time spent

outside for children was similar to other studies that report average times outside around seven, three, and six hours, respectively (Loeboch et al., 2021; Dodd et al., 2021; Steinberg, 2022). One thing that stands out about the average time spent outside is the difference between caregivers' pre-intervention and post-intervention reported time spent outside. Caregivers reported a decrease in time spent outside after the intervention. The reported difference could be due to feeling more comfortable with their children spending time outside alone as compared to before the intervention. However, this question was not explicitly asked nor mentioned by participants during the data collection process.

Participants reported wanting their children to play outside but were also clear on their safety boundaries. Participant A reported, "They can bike ride in the neighborhood, but we're not having them cross major streets on their own." Participant B reported, "We do keep an eye out for unsafe people when we're out." These sentiments are similar in the literature regarding caregiver concerns for their children not engaging in nature play because of safety issues (Brussoni et al., 2012; Parent et al., 2020). The commonality between the perceptions of safety and risk in the study and the literature exemplifies valid concerns from caregivers for their children's safety when their children are engaged in nature play activities. Despite these concerns around bike riding and strangers, caregivers still recognized the benefits of nature play. Participant C stated, "It's definitely good for the mind and the soul." Participant D similarly stated, "I think It's given them a great sense of independence and problem-solving." These statements are consistent with the existing literature on the benefits of nature play, which suggest nature play supports cognitive, social, physical, and psychological development and can be linked to health and well-being. (Loebach et al., 2021; Brussoni et al., 2018; Jelleyman et al., 2019).

The participants in the study recognized the benefits of utilizing nature play spaces for their children, yet still reported spending time in playgrounds, even after receiving the intervention. Participant A noted:

I just enjoyed the irony of realizing that what is deemed safe playground equipment in our group, that was not the case...that more kids hurt themselves falling off monkey bars or on trampolines, or some of the other standardized playground equipment.

Participant D stated, "...parks and playgrounds...I see that parents seem way more comfortable, especially in the suburbs, that those [playgrounds] are really busy."

Participants recognized that playgrounds could pose a greater risk to their children than nature play spaces. Even knowing the risks associated with playgrounds, caregivers still used playground spaces for nature play engagement, but less so after the intervention.

The reasons for utilizing playground spaces over nature play spaces could be due to proximity to their home and the time it takes to get out in nature. Participant D stated, "Yeah, there's you know, just like a neighborhood park by my house that's maybe a mile away. They spend a lot of time at the bigger parks, like my kids really like Pecos Park."

The location of the park is important to connecting children to nature play spaces and activities because it fosters the development of nature empathy (Lumber et al., 2017).

Even knowing the risks, playgrounds are accessible spaces for caregivers to connect their children to play.

The data analysis from the pre- and post-intervention surveys indicated a lack of significance for each construct. There was little to no change to any of the composite scores for risk, safety, or benefits of nature play. The reason for little change could be due

to the participants' comfort and familiarity with the topic. Several of the participants reported that it validated their perceptions of the risk, safety, and benefits of nature play. Feeling validated, while not a behavior change, is a positive result. It could indicate spending more time engaging in nature play activities and sharing those with others for a sustained period, which could lead to more pro-environmental perceptions and developmental benefits for different communities. Despite the lack of statistically significant results from the pre- and post-intervention survey, results from the qualitative data suggest some changes in perceptions.

While the results of this study showed no significant changes in perceptions, participants did report behavior changes due to the intervention. Participant E reported:

Yes, I know now that I should definitely give my kids the opportunity to play in the Sonoran Desert because it feels just as safe as any other place they would play outdoors, and it would give them so many new experiences!

Another Participant A stated:

Because of [the] study, I have been thinking about safety in nature more. I realized that of all the injuries my kids and their friends, that have required an ER or urgent care visit, so often resulted from playing on standardized playground equipment... While injuries can happen while playing in the Sonoran Desert, we've been lucky enough to not sustain any major injuries while spending time in nature.

Both of these statements reflect the participants' behavior change and their interactions with nature play in the Sonoran Desert. Given that this group of participants was generally aware of the benefits of nature play, it was encouraging that they still discussed

an increased interest in having their children play more in the desert as a result of the intervention.

The current study used experiential learning theory (ELT) as a foundational framework to build participants' understanding of safety, risk, and benefits of nature play in the Sonoran Desert. In the post-intervention survey, almost half of the participants reported making some changes to their children's risky nature play experiences. The literature on ELT shows learners going through the different cycles of learning from a lived experience, from reflection on those experiences to rethinking their experiences and then trying new experiences (Klob, 1984). In this study, participants had established perceptions of the safety, risk, and benefits of nature play in the Sonoran Desert before they began. During the intervention, they were asked to reflect on and challenge their existing perceptions. Ultimately, they were asked whether this led them to try new experiences for their children. Kuo and colleagues (2019) support utilizing this methodology for building nature play experiences as learning opportunities for children. Overall, participants did not show a significant increase in their child's time or engagement in the Sonoran Desert as a result of the study. However, based on the existing literature, their perceptions and behaviors did move in the direction that would have been expected.

Participants engaged in a learning cycle utilizing active experience that turned into reality through the reflection of practice in the intervention. The current study was intended to connect participants to nature play experience and promote a personal connection between the caregivers, children, and nature through engagement in an informal learning experience on Instagram. Both SES groups made similar constructors

of knowledge through the process. The literature supports ELT as a framework for environmental education and connecting caregivers and children to nature (Moseley et al., 2019). Both SES groups gained knowledge by actively engaging with the intervention content designed to connect them to resources that would promote increased interactions with nature for their children.

Research Question 2: Did SES influence the way that caregivers perceived and engaged with nature play, as a result of the intervention?

Socio-economic status (SES) did not significantly impact participant perceptions in this study or their reported interactions with nature play. Surprisingly, however, caregivers in the lower SES group reported that their children spent about 7.5 hours outside before the intervention and approximately 6.25 hours at the end of the study. Caregivers in the higher SES group reported that their children spent about 5.5 hours outside before the intervention and about 8.5 hours at the end. Caregivers in the lower SES group decreased their own time outside from 11.25 hours outside before the intervention to 10.5 hours after, while caregivers in the higher SES group reported almost 10 hours outside before the intervention and 9 hours at the end. The literature on SES and nature play engagement indicates that typically those in the lower SES groups would spend less time doing nature play activities compared to the high SES groups (Delisle-Nystrom et al., 2019). However, in this study, this was not the case. Caregivers in the lower and higher SES groups were almost the same in their amount of time spent outdoors at baseline. This may be because most of the caregivers (regardless of their SES groups) were already engaged in nature play in the Sonoran Desert in some way, which would suggest they spend more time outside compared to participants in other studies.

Another possible reason for the lower and higher SES groups to spend a similar amount of time outside could be due to the lack of representation of a wide range of SES groups. There could be several reasons participants spent more time outdoors than their children did, such as schedules, the ability to choose their free time more than their children, or personal hobbies. The participants that were grouped into the lower SES group in this study would likely not be in the low SES group in other studies (as they did not meet state or national guidelines for qualifying as “low SES”).

A more accurate representation of low SES would be engaging families of four with an annual household income of around \$27,000 as it is the extremely low-income line defined by Phoenix Human Services (2022). Comparing the approximate \$27,000 to the national poverty guidelines of \$30,000 for a family of four indicates these numbers represent similar experiences for the families (U.S. Health and Human Services, 2023). Engaging with families in the extremely low-income line could show a different data set compared to the data set that was obtained from the current pool of participants. The participants in this study were separated between lower and higher SES by the \$80,000 cut score to represent different SES groups. However, comparing the participants in this study to those living in poverty in Phoenix is not an accurate representation, and the literature on low SES and high SES would not have a strong correlation due to the cut score being very high comparatively.

In higher and lower SES families, caregivers reported spending less time outside with their children at the end of the intervention than at the beginning. At the end of the study, children increased their time outside. This suggests caregivers were allowing their children more freedom to spend time outside unsupervised and to determine their own

nature play activities. The higher SES group caregivers reported that their children would spend more time outside after the intervention. In contrast, the lower SES group reported that their children would spend less time outside after the intervention. The behavior change in the lower SES group was the opposite of the desired impact of the intervention. This change could have been due to caregiver perceptions that were too cautious in specific spaces and during certain times of year in the Sonoran Desert. Participant B reported:

I mean excessive temperature probably would be too risky if it was like a very hot day. We probably would not play in a fully exposed area. Um, also depending on the age of my kids. If we were in an area where there was known to be um like active rattlesnakes.

Participant C reported, “the only thing that makes me feel uncomfortable is when they take their shoes off.” Caregiver perceptions are central to their children’s ability to connect with nature and engage in nature play experiences.

Caregivers in both SES groups recognized the importance of risky nature play and its benefits for children. When analyzing results between the construct of risky nature play benefits for any child, the lower SES group had statistically significant positive changes compared to the higher SES group. The literature on SES and the benefits of nature play suggest that lower SES groups are less likely to engage in nature play activities due to barriers like media access (Tandon et al., 2012). In this study, the lower SES group would not be considered low in the traditional sense as their annual household income is above the state and national poverty lines. Both SES groups either started with higher interactions with nature play activities or had a significant positive change for

those interactions. Since there was so much comfortability with the themes of safety, risk, and benefits of nature play, it is unsurprising that the results indicated few changes to the participants' perceptions. In this study, both SES groups were already highly engaged in nature play activities and understood its benefits for their children.

Both SES groups reported similar nature play activities after interacting with the intervention. One of the most common nature play activities was tree climbing. Participant A stated, "...climbing trees, playing on rock piles they were building..." Participant B stated, "I mean, they love to climb trees..." and Participant C reported, "My kids are tree climbers. So anytime there's a climbable tree. That's what they're doing." Participant D reported, "And kids can climb and explore, and I'm really pretty comfortable with them doing stuff." Tree climbing seems to span across the SES groups. Tree climbing as a nature play activity is the great equalizer as there are few monetary expenses needed to participate in the activity. Even with this simple activity, only the higher SES participants stated schedules as a reason for their children not to engage in nature play activities. Participant A reported, "I think also being over-committed with activities, and so like the girls also do Girl Scouts and dance." Participant D reported, "You know, nowadays [children] just have incredibly busy schedules..." The literature has represented overscheduled children (Li et al., 2018). However, caregivers control the children's schedules and nature play activities, so if they were uncomfortable with an activity or did not build in time for it in the schedule, the nature play activity was unlikely. SES did not have a major impact on caregivers' and their children's perceptions or behavior change after engaging with the intervention.

Research Question 3: How was the intervention engaging and useful?

Participants were asked if each week's content was helpful in their daily lives. Each week had a different theme around safety, risk, and benefits of nature play in the Sonoran Desert. Week one had the most comments, and the theme was around fears of the Sonoran Desert. The posts asked participants to share their fears of the Sonoran Desert. The reason for more comments during that week could have been due to the desire to share participants' lived experiences and connections to a community of like-minded people. The third week of the intervention covered the benefits of nature play in the Sonoran Desert and received the most "likes" of all weeks of the intervention. Given that most participants were already engaged in nature play with their children, it is unsurprising that this week had the most likes. This week's content validated participants' experiences with nature play and their benefits in the Sonoran Desert. Week three, benefits of nature play, had the most shares. This may have been because participants wanted to connect with others in their community to show the benefits of nature play by sharing the information with others in their network to build more nature play engagement. Connecting with others is an integral part of the human experience, and social media provides an opportunity to share that information.

In semi-structured interviews and intervention comments, participants shared that the intervention content validated their views on the benefits of nature play. To illustrate, Participant B stated, "I don't think [the intervention] clearly changed any of my perceptions, but more so definitely validated them." Providing activities to try in nature may have been the easiest way to share these views with others, and its timing later in the

intervention may have made participants more comfortable to share after several weeks of seeing this information for themselves.

Participants reacted positively to the content organization of the infographics. Participants that were interviewed reported the effectiveness of the messaging. Participant A reported, “I think they were very clear. I liked the little graphics...but the messaging was clear...I imagine most people would find that effective as well.”

Participant B reported:

There were different, like sources and citations. I thought that that was helpful, that it was presented that way for anyone who wanted to look into some of the stuff a little bit further and the credibility of this information that was shared. I thought that it was also engaging like with the graphics and the pictures and stuff that were shared.

Participant C reported, “...just good information...” Participant D reported, “It was great, it was gentle, and it wasn't forceful, and it was sharing information, and not telling people what to do or what not to do, which I think is a very effective way of communicating information.” All participants reported in the intervention or the semi-structured interviews that they found the information useful, whether from the gentle nudge in ideas or in the supporting evidence. These sentiments align with the literature on best practices for effective communication of infographics, positive communication, and social media strategies (Ahmed, 2020; Bobek & Tversky, 2016; Li & Xie, 2019). Therefore, it is not surprising, but still encouraging, that participants found this presentation effective.

The intervention platform of Instagram provided a space for the mobilization of participants to connect to meaningful content. The Instagram account continued to grow

throughout the intervention. As it grew, more participants connected with the content and shared the information. Mobilized insight has been supported in the literature and is shown to grow networks of groups and communities to share in these experiences that participants are passionate about (Chen et al., 2021). The literature supported the utilization of Instagram, as it was an easy mechanism to connect with different communities (Klassen et al., 2018; Shahbaznezhad et al., 2022). Through social media, participants connected to the content that was meaningful to them and shared their experiences.

Some consider nature and technology to be at odds with each other. Nevertheless, these mediums can successfully connect participants to a topic they are passionate about as long as the content is developmentally appropriate. Utilization of technology allowed for connection to communities when it was appropriate for them in their schedules. Participant H reported at the end of the intervention, “I enjoyed the interactions with others, to get the different perspectives.” Another Participant F reported at the end of the intervention, “The content was a good reminder that I know what I’m doing and so do my kids. Great encouragement to keep getting out there!” Technology benefited the intervention as it provided a greater sense of access to reliable content. Engaging with the content through technology like cell phones and computers is supported by the literature and supports the intervention (Lindström et al., 2021). As long as technology is used to connect with the appropriate audience, it can effectively build communities (Papadakis et al., 2018). Technology and social media were essential keys to the effective implementation of the study as it allowed participants to connect to content that

supported their beliefs and access the information across a wide range of locations around Arizona.

The utilization of social media platforms like Instagram to deliver the intervention was likely successful due, in part, to constructivism. Constructivism allows people to create their understanding of the world while also building on prior knowledge. The intervention allowed participants to construct meaning from the content and either challenge or validate their earlier experiences. By asking participants to engage interactively with the posts, it also encouraged them to build and reflect on their own experiences (incorporating both constructivism and ELT) to better articulate their beliefs. Instagram was a space for people to connect and build meaningful interactions with content. The literature supports constructivism and Instagram as a space to connect to different audiences (Carpenter et al., 2020). The Instagram account connected to communities that would create meaning around the content and build a deeper connection to the information.

Limitations

There were several limitations to this study. Despite extensive efforts to recruit 15 participants, only 13 signed consent forms for the study. Two participants also dropped out over the course of the six-week intervention, which was a 15% drop in the participant pool. Given the small sample size, the results cannot be generalized to the population of residents in the Phoenix metropolitan area or a wide variety of SES groups. Most participants were already engaged in nature play with their children and were already supporters of nature play in the Sonoran Desert. This was primarily due to the recruitment process. All Instagram users in Arizona were solicited through the account,

and the followers on the account grew over time. Targeted recruitment was then tried through nature organizations across the state. Thus, when participants were recruited through these venues, it made sense that many were already strong supporters of nature play. The list of the organizations and networks that the researcher connected with was extensive, and it was hoped that more participants would join the study, but that did not occur.

Another limitation of this study was the small variation between participants regarding household income. The mean household income of \$80,000 for those participating in the study is above the state average of about \$65,000 (U.S. Census, 2020). The poverty line for a family of four in Phoenix is around \$27,000 yearly (Human Services, 2022). Therefore, the sample does not accurately represent Arizona's wide range of SES. Even though Instagram is free to create an account, internet, and cell phone services can impact participants' ability to engage with online platforms. Even if the participants had regular access to the internet and Instagram, the software that Instagram uses might have played a factor in connecting with participants with lower SES.

Participants were asked to connect with the research account on Instagram three times a week on Mondays, Wednesdays, and Fridays for six weeks. The Instagram algorithm might not have brought up the account on the would-be participants' feed, which could have diminished connection to the content and account. The algorithms for social media platforms like Instagram are incredibly complicated, and the researcher attempted to overcome this limitation by setting clear expectations at the beginning of the study in the recruitment process, after the pre-intervention survey was distributed, and during follow-up communications with the participants to ensure the participants were

engaging with the account. Despite these limitations, the study presented meaningful information about perceptions of safety, risk, and perceptions of nature play in the Sonoran Desert that will influence the researchers' and environmental educators' practices.

Finally, given that this was an online study, participants could have impersonated someone, claiming to fulfill the inclusion criterion but did not. With online services like social media, determining if an account truly represents an individual and not an impersonator or a computer was a limitation. Impersonation was accounted for by having multiple steps to connect and verify each participant through signing consent forms. The researcher also reviewed each account to ensure it was associated with a living person. The participant needed to follow the study account to ensure they received the intervention information on their social media account.

Implications for Practice

While the study had limitations, there were still actionable items for environmental educators to consider in building supportive connections with caregivers. Caregivers mentioned in the post-intervention and intervention comments that they wanted a space to join other like-minded people, communities, and organizations. Participant I stated, “I enjoyed the interactions with others, to get the different perspectives.” Spaces like Instagram can provide an opportunity to build those connections. The web and social media provided a space for mass mobilization around environmental education and to promote the benefits of nature play. When creating content for future social media posts, infographics should be considered an excellent course of action for communicating information to the participants.

Infographics were a valuable method of communication with the general public on topics of safety, risk, and benefits of nature play. Infographics take complex information and data and distill it into a visual representation of the information that is quickly digestible. Because of this, infographics continue to be utilized as a method of communication with the general public. Often, empirical articles on these topics are not written for the general public, which can dissuade the reader from engaging with the information. If the information is not easily accessible, a reader could miss valuable information.

The reliability of the information on infographics is paramount to build credibility and authority on a topic. Utilizing credible sources like peer-reviewed empirical studies on safety, risk, and benefits of nature play allowed the reader to connect to reliable information that could be useful to them. Including sources allowed the reader to check the information to determine whether or not it was credible. Environmental educators who create infographics that utilize credible and reliable information will bolster their authority.

Building a community on Instagram surrounding the safety, risk, and benefits of nature play can help reach communities across the Phoenix Metropolitan area. Meeting the audience where their needs are is important to building a community space that welcomes everyone regardless of their comfort level with nature (Carpenter et al., 2020). As shown in this study, meeting the reader where they were most comfortable has the potential to start a conversation or spark ideas about the activities and information they enjoy. This could lead to behavior changes for children. Building a community on Instagram required asking engaging questions and prompts around the activities and

information. Through the questions and prompts, more readers engaged with the account by sharing their stories and personal experiences. The stories and personal experiences created content for future posts on activities for children to take part in in the Sonoran Desert. Having a community on Instagram that wants more information on safety, risk, and benefits of nature play in the Sonoran Desert is important to continue to make behavior changes for families in the Phoenix Metropolitan area.

The final implication for practice is the necessity of creating a solid social media plan for any efforts going forward. Social media plans create a logical method for understanding how the account will build engagement and meet the plan's objectives. The original plan utilized only a month of engagement posts and recruitment posts, two weeks for engagement and two weeks for recruitment. In reality, a more extended period was needed to build engagement and recruit participants for the study. There should also be more targeted recruitment to groups representing a wide range of SES families to ensure better representation of all family types. Creating solid and realistic social media plans is essential to improving the practice of connecting caregivers to relevant information on the safety, risk, and benefits of nature play in the Sonoran Desert.

Implications for Arizona

The impact of this research for Arizona, and especially for families that live in and around the Phoenix Metropolitan area, is that it creates the possibility of shifting popular thinking about the Sonoran Desert. Much of the literature presented is focused in areas of the world that have more temperate climates. While these temperate climates are absolutely part of nature, it must be recognized that the Sonoran Desert is a plausible space for nature play as well. Shifting the focus to the benefits of being in nature in the

Sonoran Desert despite the potential harms is essential to connecting more communities to it. Newspapers and social media should spend time touting the benefits of nature and the advantages of spending time in it. The Sonoran Desert offers just as much value to children and adults as any other natural space in the world. Participants in this study recognize the safety and risk factors of the desert and, at the same time, also connect themselves and their children to it. The Sonoran Desert is a space where nature play can take place, and more research on the benefits of nature play and access is needed.

Implications for Future Research

There were several implications for future research topics on the safety, risk, and benefits of nature play. The current study did not address caregivers' perceptions of nature play based on the child's gender. Depending on the gender of the caregiver and the gender of the child, caregivers may feel more or less comfortable with different types of risky nature play. Understanding these differences may allow for more tailored information for different gendered parents or children in the future.

The current study did not address risk aversion during nature play and its impact on children in the long term. Throughout the study, risk was a central theme in understanding caregivers' perceptions of the benefit of nature play. If children were afraid to take risks during nature play in the Sonoran Desert, this could create adults that are even more cautious of their children's play activities and lead to less connection and empathy towards nature. Children who are more averse to nature are less likely to engage with nature later in life (Waite et al., 2021; Sachs et al., 2020; Chawla, 2020; Strife & Downey, 2009). Developing a long-term study that addresses children's risk aversion to nature play in the Sonoran Desert would create a solid foundation for interventions in the

future. It was assumed that children make risk assessments constantly when engaging in nature play, even if they were unaware of those decisions. Future research could explicitly explore children's perceptions of risk and uncertainty in nature play in the Sonoran Desert. It could illuminate ways to connect children to nature that is meaningful to them. Without creating meaningful interactions with nature, children are less likely to engage with it in the future (Sachs et al., 2020; Chawla, 2020; Deville et al., 2021).

As this study primarily focused on children between the ages of 5-12, and their caregivers' perceptions of safety, risk, and benefits of nature play, future research could address the same topic for younger children ages 0-5. Children between the ages of 0-5 are like sponges and absorb everything around them to create meaning relevant to their experiences (Allen & Kelly, 2015). Completing this same study focusing on a different age group of children would directly impact caregivers' perceptions of safe ways for their children to engage with nature.

Flora, fauna, and weather were concerns of the participants in this study. Depending on the season, these fears or risks would be more or less present. The current study gathered data on the average time spent outdoors throughout the year, as well as activities that caregivers were engaged in between August and September. To create a better understanding of the types of activities caregivers and their children participate in throughout the year, efforts to assess those activities would significantly impact future iterations of the research.

Socioeconomic status (SES) was a major component of the current study to assess access and perceptions of nature play in the Sonoran Desert. Future research could explore what SES predictors lead to greater participation in risky nature play in the

Sonoran Desert. Nature should be accessible regardless of income, education, and location. Developing a better understanding of what predictors lead to greater nature play engagement in the Sonoran Desert could lead to new content for the social media account to bridge the gaps that are either perceived or lived. Bridging the gaps fosters the development of the whole child.

Conclusion

This action research study was designed to assess changes in caregiver perceptions of safety, risk, and benefits of nature play in the Sonoran Desert as a result of an online information intervention. There was limited research on this topic in the literature for the Phoenix Metropolitan area. Engaging participants through a social media account on Instagram was intended to meet them where they were and help them engage in their local community. The study used a mixed methods approach to create a strong sense of reliability and validity of the acquired data. The intervention effectively communicated information through infographics and employed positive communication; however, it did not provide conclusive evidence of change in caregiver perceptions or child behavior, regardless of SES. The major takeaways from this study are that the participants who engaged with the study were somewhat comfortable and already engaged in nature play in the Sonoran Desert. The study validated participants' perceptions, provided resources, and built a community to connect to meaningful and relevant content. The study showed that social media was a valuable tool to connect to audiences across the platform and provided implications for practice and future research. Perceptions of safety, risk, and benefits of nature play in the Sonoran Desert are essential to building future stewards of the natural environment. Continued work on this topic is critical for future generations.

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APPENDIX A
CYCLE 1 INFOGRAPHICS

TIPS FOR PARENTS AND CHILDREN TO ENGAGE WITH THE SONORAN DESERT

DESERT SAFETY



BE MINDFUL OF CACTI

Pack a fine tooth comb to remove needles from shoes.



HIKING IN WASHES AND SLOT CANYONS CAN BE DANGEROUS

When storms are possible flash floods can happen at any time.



REMEMBER TO BRING PLENTY OF WATER

Dehydration can happen quickly so remember to drink water and electrolytes often. (Remember if you are thirsty it's already too late.)



GIVE WILDLIFE SOME ROOM

Animals can be unpredictable so it is best to observe them from a distance.



WEAR SUNSCREEN

Even on cloudy days sunburns are possible, so remember to reapply sunscreen to protect yourself from the sun's rays.



SPEND TIME OUTDOORS DURING COOLER PARTS OF THE DAY

In the summer, spend time outside in the late afternoon or in the early morning.

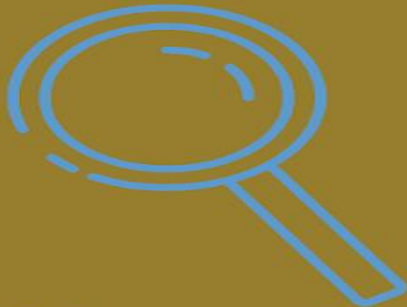


Better Academic Performance:

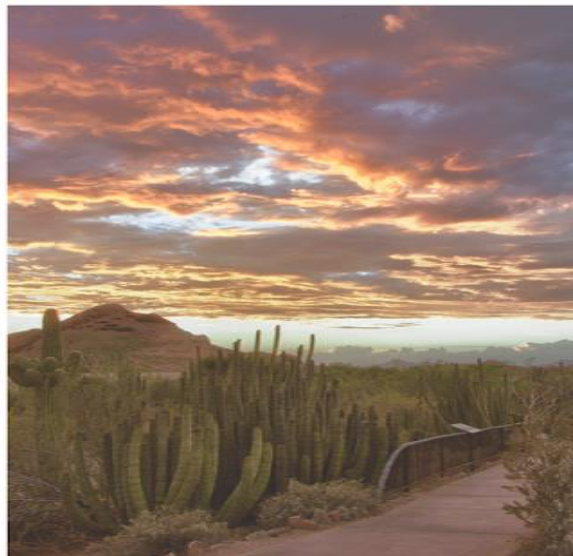
Learning in natural
environments
can...



Boost performance in
reading, writing, math,
science, and social
studies



Enhance creativity,
critical thinking, and
problem solving





Enhanced Attention:

Spending time in nature can help children...



Increase Focus and Attention




Decrease ADHD Symptoms





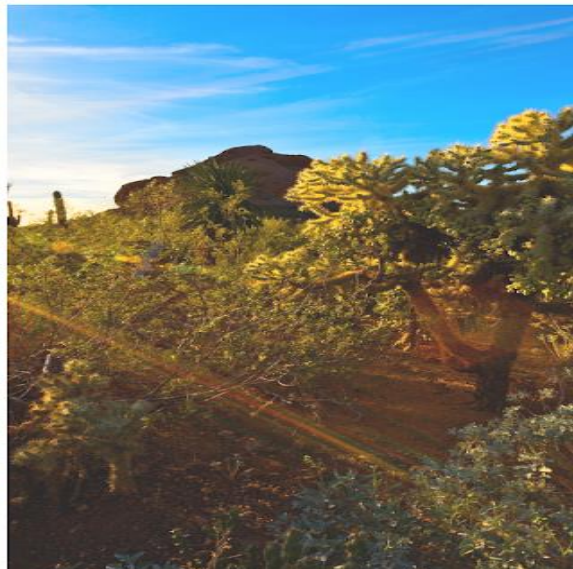
Increased Engagement and Exploration:
Discovery through outdoor experiences can promote...



Increased Enthusiasm for Learning



Greater Engagement with Learning





Improved Behavior:

Nature-based play is associated with reduced aggression and fewer discipline problems due to...



More Impulse Control



Less Disruptive Behavior





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APPENDIX B

INTERVENTION, CONTENT, SOCIAL MEDIA POSTS

Week Theme	Date	Type of Post	Specific Topic/Idea	Specific Post (content)
Participate in Study?	July 4	Info/Poll	Are you interested in participating in this study?	Want to learn more about the Sonoran Desert, Play, and Safety? Join this 6-week study!
	July 6	Question/Comment	Share your thoughts	Join the study by messaging me you email!
	July 8	Idea	Share link to pre-survey	Join the study by messaging me you email!
Week Theme	Date	Type of Post	Specific Topic/Idea	Specific Post (content)
Fears of Desert	August 22	Info/Poll	Stats on injuries in outdoor environments	The highest overall injury rates occurred during tackle football, bicycle riding, other wheeled sports, tennis and soccer. Children were significantly more likely to be injured while participating in these activities than while engaging in active play.
	August 24	Question/Comment	What are your fears or anxieties about your child(ren) playing outside in the desert?	What are your fears or anxieties about your child(ren) playing outside in the desert?
	August 26	Idea	Fears we exhibit as adults are passed onto our child(ren)	Our fears could be passed on to children according to Peter Muris and Andy Field, what fears of the Sonoran Desert do you have that you have noticed in your children?
Week Theme	Date	Type of Post	Specific Topic/Idea	Specific Post (content)
Current Outdoor time	August 29	Info/Poll	How often are you and your child outside?	In an average week, how many hours a day does you/your child play outside?
	August 31	Question/Comment	What are your favorite things to do outside currently?	Share in the comments below what you and your children like to do outside!
	Sept 2	Idea	Infographic on outdoor time	On average most children spend about 2 hours a day in a typical week outside and 4.5 on the weekend days. The most reported activities were hanging out, biking, jogging, or running and using electronic media outdoors. While outdoor nature-based activities were only found in about 30% of participants reported time outside.
Week Theme	Date	Type of Post	Specific Topic/Idea	Specific Post (content)

Benefits of Nature Play	Sept 5	Info/Poll	Do you think Nature play is good for you and your child?	How would you define nature play? On a scale of 1-5 how likely are you to allow your child to engage in nature play in the Sonoran Desert?
	Sept 7	Question/Comment	Have you seen your child participate in: play at height, play with high speed, play with tools, play near dangerous elements, rough and tumble play, play to disappear or get lost?	Have you seen your child participate in: play at height, play with high speed, play with tools, play near dangerous elements, rough and tumble play, play to disappear or get lost?
	Sept 9	Idea	Infographic on nature play	https://www.childrenandnature.org/wp-content/uploads/NaturePlayInfographic.pdf . https://naturalstart.org/resources/neef-infographic-children-nature
Week Theme	Date	Type of Post	Specific Topic/Idea	Specific Post (content)
Safety in the Desert	Sept 12	Info/Poll	Is safety important when engaging in nature play in the sonoran desert?	Is safety important when engaging in nature play in the sonoran desert?
	Sept 14	Question/Comment	What do you do to be safe while playing in the Sonoran Desert	Comment below with how you do or would safely play in nature in the Sonoran Desert.
	Sept 16	Idea	Infographic on safety in Sonoran Desert	https://www.phoenix.gov/Parks/Trails . https://www.pcta.org/discover-the-trail/backcountry-basics/leave-no-trace/ . These might seem like simple recommendations for safety, but they work! No matter how frequently we go out in the Desert we need to be reminded of these lifesaving steps.
Week Theme	Date	Type of Post	Specific Topic/Idea	Specific Post (content)
Easy Ways to nature play in desert	Sept 19	Info/Poll	Images of nature play	Would you allow your children to play in this nature play area? Explore your local park and report what you did later this week!
	Sept 21	Question/Comment	Images of nature play	What are the children doing in this picture? Explore your local park and report what you did later this week!

	Sept 23	Idea	Images of nature play	Engaging Nature Play Activities in the Sonoran Desert, explore your local park and report what you did later this week!
Week Theme	Date	Type of Post	Specific Topic/Idea	Specific Post (content)
Reflection/What Have You Learned?	Sept 26	Info/Poll	Was this beneficial?	Did you find the content useful?
	Sept 28	Question/Comment	Reflect on your thought process during the intervention	In the comments below, share your thoughts on safety in the Sonoran Desert!
	Sept 30	Idea	Share what you have learned	In the comments below, share your thoughts on nature play in the Sonoran Desert!

APPENDIX C
INFOGRAPHICS

Week 1 Fears of the Sonoran Desert:



What are your fears or anxieties about your child(ren) playing outside in the Sonoran Desert?

Comment below with your thoughts!



Nature and Outdoor Play



Nature and Outdoor Play injuries

Each year in the United States, emergency departments treat more than 200,000 children ages 14 and younger for playground-related injuries



About 45% of playground-related injuries are severe—fractures, internal injuries, concussions, dislocations, and amputations



About 75% of injuries related to playground equipment occur on public playgrounds



Most injuries occur at schools and daycare centers



Nature and Outdoor Play injuries

Active play in children ages 5-12 accounts for almost 50% of their physical activity time.



In one study, the highest overall injury rates occurred during tackle football, bicycle riding, other wheeled sports, tennis and soccer than from active play.



Boys are nearly 2x more likely to injure themselves compared to girls



In the same study, boys sustained more injuries than girls while participating in activity play and wheeled sports.



Nature and Outdoor Play injuries


U.S. National Parks from 2003 and 2004 had about 542 million visitors.



The most common cause of injury to children and youth was motor vehicle crashes at 20%



Nature Play activity injury rates for children and youth from the same study were 11% from swimming and 16% from hiking.

Other studies show that nature play injuries are typically minor injuries with little to no medical treatment at all.



Can our fears of the Sonoran Desert be passed on to our kids?

The short answer is probably.



Fear and our kids

Fear in children is motivated by real or imagined threats to protect themselves



Fear is a normal part of child development

One study found that parents fears for their children were from normal life events like interactions with animals, injuries, or social situations



While children from the same study were most afraid of external and violent events

Fear and our kids

Our reactions to our own fears when children are playing in nature can lead to children developing similar anxieties



There are many other factors that can lead to children developing fear of nature, like developmental level and early experience with uncontrollable events

In one study, parents that had general fears of safety and harm from strangers, reported their child were less likely to play and travel independently in their community



In the same study, as our kids grow up, parental fears gradually lessen.

Fear and our kids

To minimize these fears you can...

Use positive information



Provide realistic information



Doing activities together with your children can help lessen parental fear



Week 2 Time Spent Outside:

HOW OFTEN ARE YOU AND YOUR CHILD OUTSIDE?

How would you define nature?
Comment below!

HOW OFTEN ARE YOU AND YOUR CHILD OUTSIDE?

In an average week, how many hours a day does your child play outside in nature?
Comment below!

HOW OFTEN ARE YOU AND YOUR CHILD OUTSIDE?

In an average week, how many hours a day do you play outside in nature?
Comment below!

WHAT DO YOU AND YOUR CHILD(REN) LIKE TO DO OUTSIDE IN NATURE?

Comment below!!

KID'S OUTDOOR AND NATURE TIME

A study completed by the USDA Forest Service found...

Kids generally spend at least 2 hours a day outside on weekdays

Kids generally spend about 4 hours a day outside on the weekends

KID'S OUTDOOR AND NATURE TIME

Boys were typically outside more than girls on both week days and weekend days

Girls were more likely to spend a half hour or less outside compared to boys both during the weekdays and weekend days



KID'S OUTDOOR AND NATURE TIME

Young kids (6-12) spend more time outside on weekend days than older kids (13+)

Older kids (13-15) spent more time outside during the week than young kids (2+ hours)

KID'S OUTDOOR AND NATURE TIME

Hispanic youth spend more time outside on both weekdays and weekends than other ethnic/demographic groups

White youth generally spent less time outdoors during the week but more on the weekends



KID'S OUTDOOR AND NATURE TIME

Most common outdoor activities were...

- playing,
hanging
out
- biking,
jogging,
or
running
- using
technology
outdoors



KID'S OUTDOOR AND NATURE TIME

Other common outdoor nature
activities for older kids were...

- bird
watching
and
wildlife
viewing
- hiking,
camping,
fishing



KID'S OUTDOOR AND NATURE TIME

Most common reasons for kids to not be
outdoors or in nature were...

- listening
to music,
art, or
reading
- watching
TV, movies,
or playing
video
games
- surfing
the web
and
texting



KID'S OUTDOOR AND NATURE TIME

Accessibility reasons to not be
outdoors or in nature were...

- access to
outdoor
recreation
locations
- lack of
transportation
- safety
concerns
- weather-
related or lack
of time due to
schedules



Week 3 Benefits of Nature Play:

How would you define nature
play?

Comment
Below!

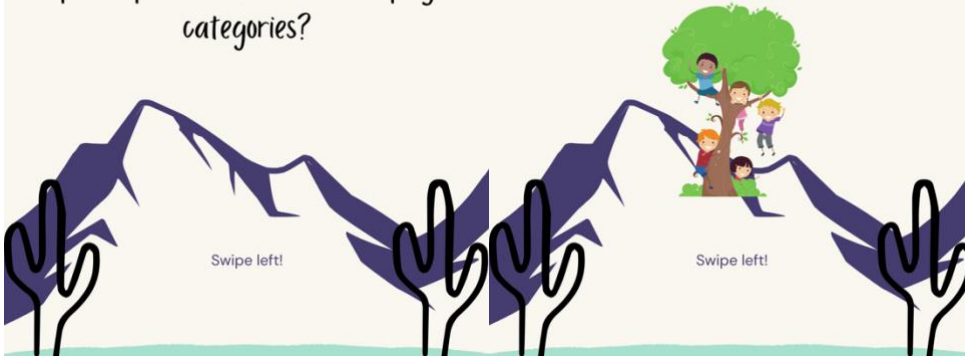
On a scale of 1-5, how likely are
you to allow your child to engage
in nature play in the Sonoran
Desert?

Comment
Below!



Have you seen your child participate in these 6 nature play categories?

Play at great heights?



Play with high speed?

Play with tools?



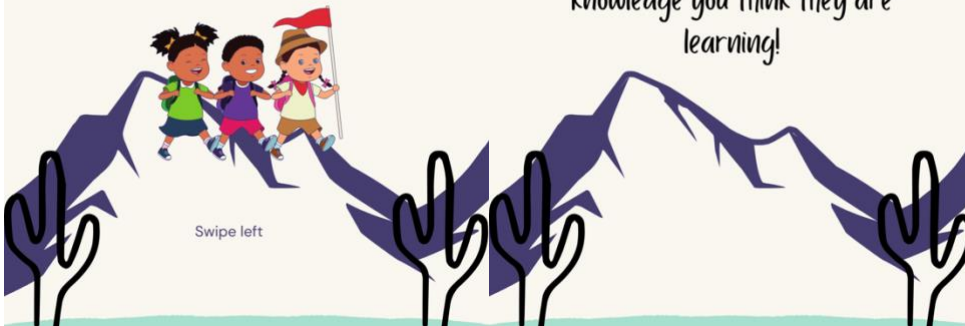
Play with the elements?

Rough and tumble Play?



Play where kids disappear like exploring alone?

Comment below with their favorite category and what skills or knowledge you think they are learning!



NATURE CAN IMPROVE ACADEMIC OUTCOMES

Spending time in nature enhances educational outcomes by improving children's academic performance, focus, behavior and love of learning.

BETTER ACADEMIC PERFORMANCE

Learning in natural environments can:

- BOOST PERFORMANCE** - Improving writing, reading ability, math skills and social studies.
- ENHANCE** - Improving critical thinking and problem solving.

ENHANCED ATTENTION

Spending time in nature can help children focus their attention.

- FOCUS AND ATTENTION** - Increases.
- ADHD SYMPTOMS** - Decreases.

INCREASED ENGAGEMENT & ENTHUSIASM

Exploration and discovery through outdoor experiences can promote motivation to learn.

- INCREASED ENTHUSIASM FOR LEARNING** - 15%.
- GREATER ENGAGEMENT WITH LEARNING** - 10%.

IMPROVED BEHAVIOR

Nature-based learning is associated with reduced aggression and fewer discipline problems.

- MORE POSITIVE BEHAVIOR** - 10%.
- LESS DISCIPLINE PROBLEMS** - 10%.

Additional Research on the Benefits of Nature and Use of Urban and Suburban Green Space

What research tells us: UNSTRUCTURED PLAY benefits healthy child development

- Fun and Creativity**
 - Unstructured play is fun and promotes creativity.
 - This is especially true when using objects that can be moved, carried, combined, redesigned, lined up, and taken apart and put back together.
- Social Health and Team Work**
 - Unstructured play at recess is shown to strengthen problem solving and conflict resolution skills.
 - Outdoor play where children can explore independently can improve social health indicators.
- Mental and Emotional Health**
 - Unstructured play is important to children's mental and emotional health.
 - Unstructured play can promote positive self-concept and self-esteem.
 - Active play can help decrease anxiety and depression.
- Physical Health and Gross Motor Skills**
 - Active, unstructured play helps reduce sedentary behaviour, promotes healthy weights and improves gross motor skills.
 - This reduces body fat, improves musculoskeletal and cardiovascular fitness which benefits physical health.
- Learning and Attention at School**
 - There is a reported association between unstructured play at recess and improved cognitive skills, such as attention, concentration and memory, as well as improved grades and standardized test scores.
- Resiliency and Risk Management Skills**
 - When children experience uncertainty in play they can develop emotional reactions, physical capabilities, coping skills and are better able to manage adversity.
 - These skills promote resilience and independence to thrive in adolescence and adulthood.

NATURE PLAY CAN ENCOURAGE CARE FOR THE EARTH

THE ISSUE: Childhood has moved indoors, leaving kids disconnected from the natural world. Children who are connected to nature have better health, higher satisfaction with life, and pro-environment behaviors.^{1,2,3}

MEANINGFUL OUTDOOR EXPERIENCES BENEFIT CHILDREN AND INSPIRE THEM TO LOVE AND CARE FOR NATURE.

HOW TO CREATE NATURE CHAMPIONS:

- Provide fun, hands-on nature experiences.
- Take learning outside.
- I have kids role-play a good thing in nature so they can improve their connection to nature.
- Share your love of the outdoors with children.
- Repeat!

Meaningful, positive experiences in nature guide children, youth and adults toward care for nature.⁴

Time in nature during childhood and role models who care for nature are the two biggest factors that contribute to environmental stewardship in adulthood.^{5,6}

THE BENEFITS OF TIME IN NATURE:

- BETTER SOCIAL SKILLS** - 15%.
- ENHANCED HEALTH** - 10%.
- INCREASED SELF ESTEEM** - 10%.
- IMPROVED GRADES** - 10%.
- PRO-ENVIRONMENT BEHAVIORS** - 15%.
- STRONGER EMOTIONAL CONNECTIONS TO PEOPLE AND NATURE** - 15%.

Additional Research on the Benefits of Nature and Use of Urban and Suburban Green Space

NEEF Children & Nature

Being active in nature makes kids healthier.

- Children being physically active in a park are more likely to have higher rates of physical activity.
- There are more than 20,000 parks and 11,000 playgrounds – totaling over 1.5 million acres – in cities across the U.S.
- Children living within 0.5 mile of a park with playgrounds are 15% more likely to be physically active.
- 80% of respondents (80% for all ages) said that they would use more electronic media if they had less time with electronic media.
- 25% spend more than 7 hours a week with video entertainment media.
- More than 1 in 3 children in the U.S. are overweight or obese. Childhood obesity is a leading health concern that increases the risk of chronic disease in adulthood.
- 5,000 youth are diagnosed each year with type 2 diabetes. The number is expected to increase by 50% by 2030.
- 7 million children in the U.S. have asthma. Childhood asthma is the most common chronic health condition.
- Exposure to nature can reduce stress levels by nearly 20% in children.
- More than 200,000 youth in the U.S. are overweight or obese. Childhood obesity is a leading health concern that increases the risk of chronic disease in adulthood.
- There are 200,000 youth in the U.S. who are overweight or obese. Childhood obesity is a leading health concern that increases the risk of chronic disease in adulthood.
- There are 200,000 youth in the U.S. who are overweight or obese. Childhood obesity is a leading health concern that increases the risk of chronic disease in adulthood.
- Parents, teachers and family are the most important people who can help children be more active.
- Children receive important mental and physical well-being from their outdoor activity.
- Children who spend more time outdoors are 10% less likely to be overweight or obese.
- Nature Deficit Disorder is estimated to affect 80% of children in the U.S. who are disconnected from nature.



Week 4 Safety in the Sonoran Desert:



Safety in the Sonoran Desert

OVER 6 MILLION PEOPLE VISIT CITY OF PHOENIX MOUNTAIN PARKS IN 2021.



IN 2020, THERE WERE 217 RESCUES AT PHOENIX MOUNTAIN PARKS



IN 2021, THERE WERE 143 RESCUES AT PHOENIX MOUNTAIN PARKS



THESE MIGHT SEEM LIKE SIMPLE RECOMMENDATIONS FOR SAFETY BUT THEY WORK! NO MATTER HOW FREQUENTLY WE GO OUT IN THE DESERT WE NEED TO BE REMINDED OF THESE LIFESAVING STEPS.

Safety in the Sonoran Desert

KNOW THE WEATHER



DRINK WATER/EAT SALTY SNACKS WITH HIGH TEMPS



KNOW YOUR ABILITY LEVEL



DRESS FOR THE WEATHER



STAY ON THE TRAILS



Safety in the Sonoran Desert

PACK IT IN. PACK IT OUT



REDUCE CAMPFIRE



WATCH OUT FOR OTHERS



LEAVE WHAT YOU FIND



RESPECT WILDLIFE



COMMENT BELOW WITH YOUR GO TO OUTDOOR TIPS!

Safety in the Sonoran Desert

SOURCES

2021 CITY OF PHOENIX PARKS AND RECREATION DEPARTMENT ANNUAL REPORT: CITY OF PHOENIX PARKS AND RECREATION DEPARTMENT ANNUAL REPORT 2021 (N.D.). RETRIEVED SEPTEMBER 16, 2022, FROM [HTTPS://WWW.PHOENIX.GOV/PARKS/SITES/DOCUMENTS/PES_ANNUAL_REPORT.PDF](https://www.phoenix.gov/parks/sites/documents/pes_annual_report.pdf)

DESERT PARKS AND MOUNTAIN PRESERVES. CITY OF PHOENIX. (N.D.). RETRIEVED SEPTEMBER 16, 2022, FROM [HTTPS://WWW.PHOENIX.GOV/PARKS/TRAILS](https://www.phoenix.gov/parks/trails)

EXTENSIVE LEAVE NO TRACE INFORMATION FOR THE PACIFIC CREST TRAIL. PACIFIC CREST TRAIL ASSOCIATION. (2016, DECEMBER 27). RETRIEVED SEPTEMBER 16, 2022, FROM [HTTPS://WWW.PCTA.ORG/DISCOVER-THE-TRAIL/BACKCOUNTRY-BASICS/LEAVE-NO-TRACE/](https://www.pcta.org/discover-the-trail/backcountry-basics/leave-no-trace/)

VETNAK, A. (2021, SEPTEMBER 21). PHOENIX MOUNTAIN RESCUES DECREASE DURING PLOT PROGRAM TO CLOSE TRAILS IN EXTREME HEAT. KTAR.COM. RETRIEVED SEPTEMBER 16, 2022, FROM [HTTPS://KTAR.COM/STORY/462088/PHOENIX-MOUNTAIN-RESCUES-DECREASE-DURING-PLOT-PROGRAM-TO-CLOSE-TRAILS-IN-EXTREME-HEAT/](https://ktar.com/story/462088/PHOENIX-MOUNTAIN-RESCUES-DECREASE-DURING-PLOT-PROGRAM-TO-CLOSE-TRAILS-IN-EXTREME-HEAT/)

Week 5 Nature Play Activities and Spaces:

NATURE PLAY IN THE SONORAN DESERT

Which play area would you prefer?



A



B

Comment Below with A or B!

NATURE PLAY IN THE SONORAN DESERT

Explore your local park or nature center and report what you did later this week!

NATURE PLAY IN THE SONORAN DESERT

Which natural space would you prefer your child plays in?



A

NATURE PLAY IN THE SONORAN DESERT




B

Comment Below with A or B!

NATURE PLAY IN THE SONORAN DESERT

Explore your local park or nature center and report what you did later this week!



**NATURE PLAY IN THE
SONORAN DESERT**

Where did you and your children explore this week?

**NATURE PLAY IN THE
SONORAN DESERT**

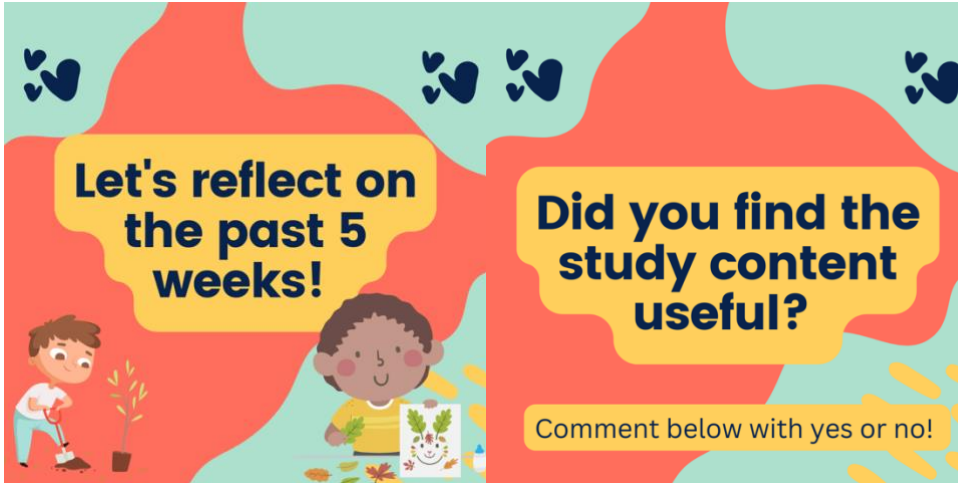
What did you and your children do in that space?



**NATURE PLAY IN THE
SONORAN DESERT
ACTIVITIES**

1. Create a nature journal and draw/describe what you see in nature
2. Build a model dam in nature
3. Create a human sundial

Week 6 Reflection:

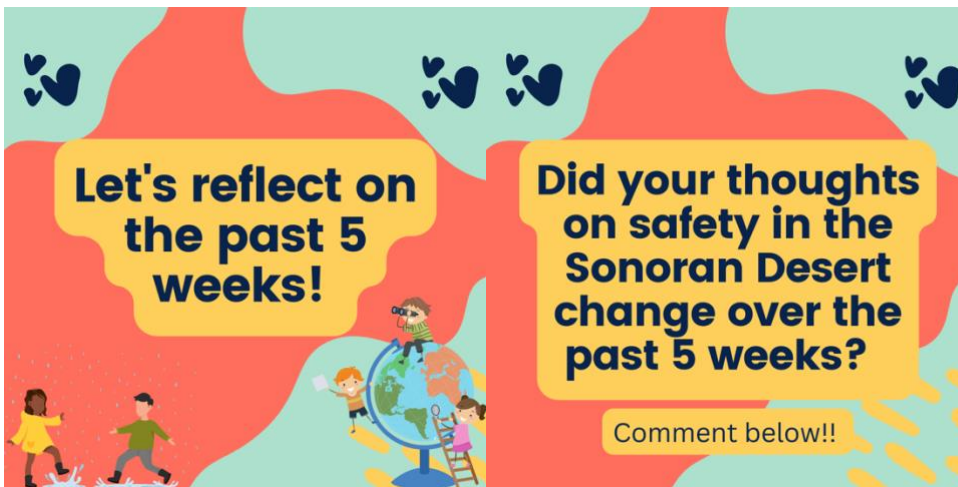


Let's reflect on the past 5 weeks!

Did you find the study content useful?

Comment below with yes or no!

This card features a red and teal background with heart icons. The left side shows a boy watering a plant and a girl holding a plant card. The right side contains a yellow callout box with a question and a comment prompt.

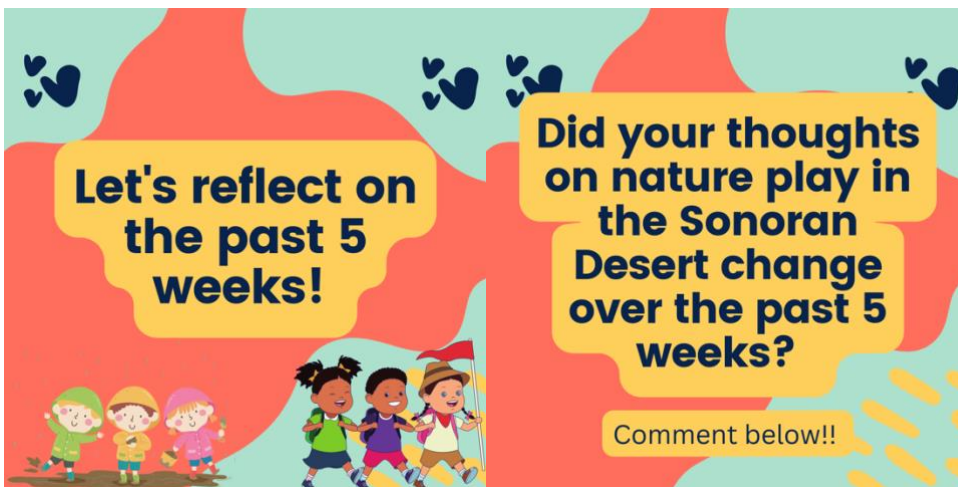


Let's reflect on the past 5 weeks!

Did your thoughts on safety in the Sonoran Desert change over the past 5 weeks?

Comment below!!

This card features a red and teal background with heart icons. The left side shows children playing and a globe. The right side contains a yellow callout box with a question and a comment prompt.



Let's reflect on the past 5 weeks!

Did your thoughts on nature play in the Sonoran Desert change over the past 5 weeks?

Comment below!!

This card features a red and teal background with heart icons. The left side shows children in raincoats and children hiking. The right side contains a yellow callout box with a question and a comment prompt.

APPENDIX D

PRE-INTERVENTION AND POST-INTERVENTION SURVEYS

Pre-Intervention Survey:

Thank you for participating in the Nature Play and Safety in the Sonoran Desert study. This survey will be used to gauge how comfortable you are with allowing your child to play in nature. The data collected will help in understanding caregiver perceptions about nature play and safety in the Sonoran Desert.

While completing the survey use these definitions to assist in your response.

Nature is defined as including plants, animals, the landscape, and other features and products of the earth, as opposed to human creations.

Nature Play is defined as any activity that gets children active or thinking actively outdoors, with the end goal of building skills and ability to play without the need for parental or adult control. This can be in any setting, so long as it's outdoors.

Risky play is thrilling and exciting play that gives children opportunities for challenging themselves, testing their limits, and exploring boundaries; for example, climbing as high as s/he likes, play-fighting, building forts with tools, exploring the neighborhood without an adult.

Risky Nature Play is defined as thrilling and exciting forms of physical play that involve uncertainty and a risk of physical injury.

To protect your confidentiality, please create a unique identifier known only to you. To create this unique code, please use the first three letters of your mother's first name and the last four digits of your phone number. Thus, for example, if your mother's name was Sarah and your phone number was (602) 543-6789, your code would be Sar6789. The unique identifier will allow us to match your post-intervention survey responses and your retrospective, pre-intervention responses when we analyze the data. My unique identifier is: _____ (e.g., Sar 6789, see paragraph above)

Demographic Information

1. What is your home zip code?
2. How long have you lived in Arizona?
3. How long have you lived at your current address?
4. What is your age?
5. What is your gender?
6. How many children do you care for, what are their genders, and what are their ages?
7. Are you the primary play facilitator with your children?
8. What is your annual household income level? (Range)
9. What is the highest level of education?

10. What is your occupation?
11. What is the closest park to your home?
12. What describes your main outdoor activities in the past 12 months?
13. What is your race?

Child Outdoor time

Not including recess, about how many days in an average week in the Spring, Winter and Fall does your child spend doing activities outside without adult supervision?

Scale 0 to 7 days and My child doesn't play outside without an adult.

On days your child goes outside to play without adult supervision in the Spring, Winter and Fall, how much time does he/she typically play (excluding recess)?

Scale 0 minutes to more than 3 hours and My child doesn't play outside without an adult.

Not including recess, about how many days in an average week during the Winter does your child play outside without adult supervision?

Scale 0 to 7 days and My child doesn't play outside without an adult.

On days your child goes outside to play without adult supervision during the Summer, how much time does he/she typically play (excluding recess)?

Scale 0 minutes to more than 3 hours and My child doesn't play outside without an adult.

Since the beginning of the school year, how often has your child played organized sports or taken lessons with a coach or instructor (swimming lessons, snowboarding, baseball, hockey, karate, dance, gymnastics etc.) not including school recess?

Scale 0 - 4 or more times a week

Caregivers Outdoor time

How many days in an average week, in the Spring, Winter and Fall, do you spend doing activities outside (e.g., playing with children, gardening, going for a walk, playing sports, or doing exercise)?

Scale 0 - 7 days

On the days when you do activities outside in the Spring, Winter and Fall, how much time do you usually spend?

Scale 0 minutes to 3 or more hours

How many days in an average week, in the Summer, do you spend doing activities outside?

Scale 0 to 7 days

On the days when you do activities outside in the Summer, how much time do you usually spend?

Scale 0 minutes to 3 or more hours

Where do you access nature? (Local Park, mountain park, county park, city park, neighborhood, back/front yard, other)

Where does your child play in nature? (Local Park, mountain park, county park, city park, neighborhood, back/front yard, other)

Nature Play and Risk

Scale: 1=strongly disagree, 5=strongly agree

Risky play can help a child...

1. Learn to make decisions.
2. Develop skills to manage risks.
3. Develop social skills.
4. Build resilience.
5. Develop self-esteem.
6. Develop self-confidence.
7. Be more physically active.
8. Build courage.
9. Become more curious about the world.
10. Become more imaginative.

Outcome expectations

Scale: 1=strongly disagree, 5=strongly agree

Now think about your child specifically to answer the following questions.

Risky play can help my child:

11. Learn to make decisions.
12. Develop skills to manage risks.
13. Develop social skills.
14. Build resilience.
15. Develop self-esteem.
16. Develop self-confidence.
17. Be more physically active.
18. Build courage.
19. Become more curious about the world.
20. Become more imaginative.

Safety/Risk and Nature Play

Scale: 1=Never, 4=Often

To what extent do these concerns make it difficult for you to let your child do risky play?

1. I am concerned that my child is going to get seriously hurt.
2. I think my child does not know how to stay safe.
3. I am worried that someone is going to harm my child, either kidnapping or assault by an adult, or bullying by other children.
4. I am concerned that other people are going to think I am a bad parent for letting my child take risks.

To what extent do these beliefs help you let your child do risky play?

1. I have seen my child manage risky play like this before and trust s/he can handle it.
2. I believe my child wants to do risky play and I want to give him/her my support.
3. It is important to me that my child has opportunities to learn, build skills and try new challenges.
4. I think risky play is a good learning opportunity for my child.

Nature Play Beliefs

Scale: 1=strongly disagree, 5=strongly agree

In my neighborhood, it is normal for children to...

1. Climb trees.
2. Jump from heights.
3. Play on playground equipment.
4. Engage in rough-and-tumble games (e.g., wrestling, play fighting).
5. Use adult tools (e.g., hammer, saw).
6. Use loose parts (e.g., sticks, tires, timber, tarpaulins) during outdoor play.
7. Roam the neighborhood with friends but without an adult.
8. Roam the neighborhood alone.
9. Ride a bicycle or skateboard in the neighborhood with friends but without an adult.
10. Ride a bicycle or skateboard in the neighborhood alone.

In my neighborhood, it is normal for....:

1. Parents are criticized for letting their child do risky play.
2. Children get in trouble when they do risky play.

Scale: Likert 5 point (1=strongly disagree, 5=strongly agree; N/A=I did not provide my child with more opportunities for risky play)

Use the space below to provide any additional feedback.

Post-Intervention Survey

Thank you for participating in the Nature Play and Safety in the Sonoran Desert study. This survey will be used to gauge how comfortable you are with allowing your child to play in nature. The data collected will help in understanding caregiver perceptions about nature play and safety in the Sonoran Desert.

While completing the survey use these definitions to assist in your response.

Nature is defined as including plants, animals, the landscape, and other features and products of the earth, as opposed to human creations.

Nature Play is defined as any activity that gets children active or thinking actively outdoors, with the end goal of building skills and ability to play without the need for parental or adult control. This can be in any setting, so long as it's outdoors.

Risky play is thrilling and exciting play that gives children opportunities for challenging themselves, testing their limits, and exploring boundaries; for example, climbing as high as s/he likes, play-fighting, building forts with tools, exploring the neighborhood without an adult.

Risky Nature Play is defined as thrilling and exciting forms of physical play that involve uncertainty and a risk of physical injury.

To protect your confidentiality, please create a unique identifier known only to you. To create this unique code, please use the first three letters of your mother's first name and the last four digits of your phone number. Thus, for example, if your mother's name was Sarah and your phone number was (602) 543-6789, your code would be Sar6789. The unique identifier will allow us to match your post-intervention survey responses and your retrospective, pre-intervention responses when we analyze the data. My unique identifier is: _____ (e.g., Sar 6789, see paragraph above)

Child Outdoor time

Not including recess, about how many days in an average week in the Spring, Winter and Fall does your child spend doing activities outside without adult supervision?
Scale 0 to 7 days and My child doesn't play outside without an adult.

On days your child goes outside to play without adult supervision in the Spring, Winter and Fall, how much time does he/she typically play (excluding recess)?
Scale 0 minutes to more than 3 hours and My child doesn't play outside without an adult.

Not including recess, about how many days in an average week during the Winter does your child play outside without adult supervision?

Scale 0 to 7 days and My child doesn't play outside without an adult.

On days your child goes outside to play without adult supervision during the Summer, how much time does he/she typically play (excluding recess)?

Scale 0 minutes to more than 3 hours and My child doesn't play outside without an adult.

Since the beginning of the school year, how often has your child played organized sports or taken lessons with a coach or instructor (swimming lessons, snowboarding, baseball, hockey, karate, dance, gymnastics etc.) not including school recess?

Scale 0 - 4 or more times a week

Caregivers Outdoor time

How many days in an average week, in the Spring, Winter and Fall, do you spend doing activities outside (e.g., playing with children, gardening, going for a walk, playing sports, or doing exercise)?

Scale 0 - 7 days

On the days when you do activities outside in the Spring, Winter, and Fall, how much time do you usually spend?

Scale 0 minutes to 3 or more hours

How many days in an average week, in the Summer, do you spend doing activities outside?

Scale 0 to 7 days

On the days when you do activities outside in the Summer, how much time do you usually spend?

Scale 0 minutes to 3 or more hours

In a typical week, do you spend 150 or more minutes on physical activity that makes you breathe harder or sweat?

Scale yes, no

Where do you access nature? (Local Park, mountain park, county park, city park, neighborhood, back/front yard, other)

Where does your child play in nature? (Local Park, mountain park, county park, city park, neighborhood, back/front yard, other)

Nature Play and Risk

Scale: 1=strongly disagree, 5=strongly agree

Risky play can help a child...

1. Learn to make decisions.
2. Develop skills to manage risks.
3. Develop social skills.
4. Build resilience.
5. Develop self-esteem.
6. Develop self-confidence.
7. Be more physically active.
8. Build courage.
9. Become more curious about the world.
10. Become more imaginative.

Outcome expectations

Scale: 1=strongly disagree, 5=strongly agree

Now think about your child specifically to answer the following questions.

Risky play can help my child:

11. Learn to make decisions.
12. Develop skills to manage risks.
13. Develop social skills.
14. Build resilience.
15. Develop self-esteem.
16. Develop self-confidence.
17. Be more physically active.
18. Build courage.
19. Become more curious about the world.
20. Become more imaginative.

Self-efficacy and behavioral skills

Scale: 1=strongly disagree, 5=strongly agree

When it comes to letting my child do risky play...

1. I could find ways to give my child more opportunities for risky play.
2. I could resist the urge to intervene when my child does risky play.
3. I could convince my partner/co-parent to support my intention to let my child do more risky play.
4. I could maintain change in the long-term to let my child do risky play.

Social support

1. I have shared the intervention content with my partner/co-parent. (Scale YES/NO)

Scale: 1=Not at all, 5=A great deal

2. My partner sees the benefits of risky play.
3. We have talked about how to let our child do more risky play.
4. We have made plans to let our child do more risky play.

Safety/Risk and Nature Play

Scale: 1=Never, 4=Often

To what extent do these concerns make it difficult for you to let your child do risky play?

1. I am concerned that my child is going to get seriously hurt.
2. I think my child does not know how to stay safe.
3. I am worried that someone is going to harm my child, either kidnapping or assault by an adult, or bullying by other children.
4. I am concerned that other people are going to think I am a bad parent for letting my child take risks.

To what extent do these beliefs help you let your child do risky play?

1. I have seen my child manage risky play like this before and trust s/he can handle it.
2. I believe my child wants to do risky play and I want to give him/her my support.
3. It is important to me that my child has opportunities to learn, build skills and try new challenges.
4. I think risky play is a good learning opportunity for my child.

Nature Play Beliefs

Scale: 1=strongly disagree, 5=strongly agree

In my neighborhood, it is normal for children to...

1. Climb trees.
2. Jump from heights.
3. Play on playground equipment.
4. Engage in rough-and-tumble games (e.g., wrestling, play fighting).
5. Use adult tools (e.g., hammer, saw).
6. Use loose parts (e.g., sticks, tires, timber, tarpaulins) during outdoor play.
7. Roam the neighborhood with friends but without an adult.
8. Roam the neighborhood alone.
9. Ride a bicycle or skateboard in the neighborhood with friends but without an adult.
10. Ride a bicycle or skateboard in the neighborhood alone.

In my neighborhood, it is normal for....:

1. Parents are criticized for letting their child do risky play.
2. Children get in trouble when they do risky play.

Scale: Likert 5 point (1=strongly disagree, 5=strongly agree; N/A=I did not provide my child with more opportunities for risky play)

Safety and Risk during Nature Play

Scale: 1=strongly disagree, 5=strongly agree; N/A=I did not provide my child with more opportunities for risky play

1. My child is happier when I let him/her do risky play.
 2. My child is more physically active since having more opportunities for risky play.
 3. My child seems more confident since having more opportunities for risky play.
 4. My child seems more able to handle things by him/herself since having more opportunities for risky play.
 5. My child seems less afraid since having more opportunities for risky play.
-
1. My child was hurt while doing risky play.
 2. My child had a bad experience while doing risky play.
 3. I was criticized by friends or neighbors for letting my child do risky play.
 4. My child got in trouble at school or a recreation facility for doing risky play.
 5. I got in trouble with school staff for allowing my child to do risky play.

Nature Play Perceptions

Scale: 1=strongly disagree, 5=strongly agree

- I think the benefits of risky play outweigh the potential harms.

Which of these statements best reflects your situation?

- I have no intention of letting my child do risky play.
- I intend to make some changes in the next week to let my child do risky play.
- In the past week, I have already made some changes to let my child do risky play.
- I don't need to make any changes because my child already does enough risky play.
- I made changes to allow my child to do risky play, but now I am back to the way things were before.

How did you feel about each of the following posts about the Sonoran Desert?

Scale: 0 = was not new or helpful information to 5 was very helpful information

- a. Pictures of the Sonoran Desert.
- b. Strategies about how to let my children play safely outdoors.
- c. Information on risks of nature play.
- d. Information on benefits of nature play.
- e. Idea for nature play activities.

What else would you like to have learned or gained by participating in this study?

Use the space below to provide any additional feedback.

APPENDIX E
SEMI-STRUCTURED INTERVIEW QUESTIONS

Semi-Structured Interview Questions

Research Questions:

- If participants are informed of safety and concepts of nature play, did their perceptions change and did participants' interactions with nature change?
- How and to what extent does socioeconomic status influence the way that caregivers perceive and engage with nature play as a result of the intervention?
- How and to what extent did participants engage and find the intervention useful?

Theme 1 - Risk and Safety

Do you feel like the Sonoran Desert is safe or unsafe?

Probes: How did your perceptions impact your child's time in the Sonoran Desert

What do you do to feel safe in the Sonoran Desert?

Probes: Can risk and safety both be present?

In your opinion is there anything that you would say is too risky when your child is playing outside?

Probes: Why do you think that?

Does having other adults present affect your child's play time outside?

Probes: What if they were not present?

Do you think other caregivers should allow their children to play outside?

Probes: Why?

Theme 2 - Benefits of Nature Play

Was there an "incident" during your child's outdoor play time that made you feel uncomfortable? Can you describe it?

Probes: Who was involved? What were they doing? Why do you think the situation occurred? What happened after the "incident"?

Can you describe a time when your kids engage in risky play or risk-taking play?

Probes: What were they doing?

The images that were posted on Instagram had images of children participating in "risky nature play," have you seen your own child participate in this type of play?

What do you consider to be your biggest concern when letting your kids play outside?

Probes: Why?

What would make nature play more accessible for families?

Probes: How would you go about doing this?

Can you tell me if you had any “a-ha” moments or moments that made you realize something while your kid(s) were playing outside?

Probes: How does this affect you? What about future decisions you will make?

Theme 3 - SES and Access to nature

Do you have a particular natural area you like to visit?

Probe: How often do you visit it?

How does location impact your ability for your child to play outside?

Probe: Why?

How often do you spend time playing outside?

Probe: What are your favorite places to visit?

How many days a week do you and your child spend time in nature?

Probe: Can you estimate how many hours on average you spend in nature?

What barriers do you and your family face when accessing nature?

Probe: Why do you think that?

Theme 4 - Intervention effectiveness

What kind of effect do you think exposure to outdoor play and the natural environment has on children?

Probes: Is it important?

What kind of effect do you think exposure to outdoor play and the natural environment has on your perception of safety outside?

Probe: Why do you think that?

Do you think the posts you saw on Instagram were effective at communicating information?

Probe: Why?

Did you share the Instagram posts on nature with anyone?

Probe: Why or why not?

Do you think the infographics on Instagram were informative?

Probe: Why or why not?

Did your perception of risk/safety change due to viewing the information on Instagram?

Probe: Why or why not?

Do you think other caregivers would need this information?

Probe: Why or why not?

Is there anything else you would like to share about your experience with nature or with the materials you saw on Instagram?

APPENDIX F
INTERVENTION SOURCE LIST

Blanchard et al., 2020; Brussoni et al. 2015; Mack et al. 2000;, Office of Technology Assessment, U.S. Congress, 1995; Phelan et al. 2001; Spinks et al. 2006; Suecoff et al. 1999; Tinsworth & McDonald, 2001; Adolph et al. 2020; Crawford et al. 2015; Salcuni et al., 2015; Larson et al., 2011; Sandseter, 2007; Sandseter, 2009; Sandseter, 2021; Children and Nature Network's *Nature Can Improve Academic Outcomes*, 2016; Liberman & Hoody, 1998; Berezowitz et al., 2015; Williams & Dixon, 2012; Wells et al., 2015; Li & Sullivan, 2016; Wu et al., 2014; Matsuoka, 2010; Moore & Wong, 1997; Taylor et al., 2002; Martensson et al., 2009; Wells, 2000; Berto et al., 2015; Taylor et al., 2001; Amoly et al., 2014; Blair, 2009; Rios & Brewer, 2014; Bell & Dyement, 2008; Nedovic & Morrissey, 2013; Ruiz-Gallardo & Valdes, 2013; City of Phoenix, City of Phoenix Parks and Recreation Department, Leave No Trace, Vetnar, 2021

APPENDIX G

INTERVENTION INSTAGRAM ACCOUNT NETWORK

Cactus Blossom Kids; Awakening Seed School; Outback Learning; Arizona Association for Environmental Education; Arizona State Parks; Phoenix Parks and Rec; Tempe Parks and Rec; Scottsdale Parks and Rec; City of Mesa Parks and Rec; Maricopa Community College; Litter Critters AZ; Seeds of the Salt River; EcoExplorersUSA; Desert Marigold School; Natural Choice Academy; Natural Start Alliance; National Association of Environmental Education; Tohono Chul; Arizona Sonoran Desert Museums; White Tank Mountains Conservancy; Central Arizona Conservation Alliance; Metro Phoenix Eco Flora; Maricopa County Master Naturalist; Pima Master Naturalists; Arizona Master Naturalist; Mountain Park Health Center; Japanese Friendship Garden; McDowell Sonoran Preserve; McDowell Sonoran Conservancy; Keep Nature Wild; Educating Children Outdoors Arizona; Nature Created Play; Be Outdoors Arizona; Creighton Education Foundation

APPENDIX H
CODE BOOK

Codes	Description
Intervention Changes	Changes to make to intervention
Intervention Like	Aspects of intervention that participants liked, information, form, presentation, etc.
Kids and technology	Kids and their use of technology
Kids Fear	Fears for kids
Parent and kids not outside on screens	Screen time, barrier to nature play
Safety Tips	Tips to stay safe in nature
Indoor play	Activities done inside a home
Kids Risk	Kids risk of injury
Nature Play Activities	Activities like climbing trees and other things to do in nature
Nature Play not in neighborhood	Barrier to nature play
Not represented in questions	Changes to be more inclusive
Perspective on Nature Play	Ideas on nature play in the Sonoran Desert
Fear other	Fear of other things happening
Fear People	fear of people that would harm kids
Fears of animals	fear an animal will hurt kid
Fears of plants	fear a plant will hurt kid
Fears of weather	fear the heat or other weather condition will hurt kids
Kids Time outside	time kids spend outside in nature
Nature Barriers	Not able to do nature play like too busy
Nature Space	definition of nature spaces and locations
New Nature Play Perspective	Change in perspective due to the intervention
Parent Fears	Parents fears of nature and kids play
Parent Time outside	time parents spend outside in nature
Playground dislike	dislike playground
Playground Injury	injury on a playground
Risk Hydration	Heat and dehydration danger
Safety Important	Reasons why safety is important
Nature Play Benefits	Describes the benefits of nature play like risk assessment and critical thinking skills

Nature Play Fears	Description of fears participants have when their kids are doing nature play activities
Nature Spaces defined	Differentiation between what is and what is not a nature play space
Overscheduled	Reasons for not doing more nature play
Parent and Safety	Parents perceptions of safety
Parent time outdoors as kid	Participants time spent in nature or outdoors as a kid
Reasons to not do Nature Play	Explanations for not doing nature play with their kids
Risk Kids and outdoor time	Parents perceptions of their kid's risk.
Risk Nature	General description of risk when in nature, parents, and kids
Risk Outside not in nature	Risk for kids when participant define nature differently
Risk Playground	Risk of being injured on a playground and stories of injury on playground
Safety and Nature	Descriptions of why it's important to be safe in nature
Social Media and Risk	Impact of technology on parents
Time outside	Kids time outside
Adults overly safe in Nature	Other adults overly cautious of nature play and similar activities
Benefits of intervention	aspects of the intervention that participants benefited from
Benefits of Nature Play	Benefits of nature play
Nature Access	Barriers to accessing nature
Nature and Lessons Learned	what to do next time when in nature
Nature Incident	Time when someone what hurt doing nature play
Nature Risk Reaction	Event after a nature play incident
Nature Safe	Descriptions on why nature play is safe
Not change behavior	Already doing nature play and not change activities
Time in Nature	kids time in nature
Adult Risk	Parents and perceptions of nature play risk for their kids
Nature Communication	How to talk about nature
Nature Play Perceptions	Parents understanding of why their kids should do nature play
Other Adult perceptions of nature	How other adults perceive kids playing

Nature Communication	how to talk to others about nature
Nature Fear	Fears, anxiety of nature
Nature Play Access	Barriers to doing nature play
Nature Play Spaces	Spaces where participants and their kids access nature
Nature Risk	Perceptions around participants kids getting hurt in nature, like falling
Other Adults Overly cautious	Adults the participant knows are too cautious
Parent Self assess fears	Participant self-assessment of their fears around their kids doing nature play
Playground risk	Risks for kids that play in playgrounds

Codes	Frequency	Content
Safety Safety and Nature	10	very safe
Safety Safety and Nature	10	desert can be very safe. My children probably spend more time um outside than some of their peers
Time outside	5	
Nature Play Nature Play Spcaces	10	mountain preserves desert Mechanical Garden, the arboretum um
Nature Play Nature Play Spcaces	10	heir friends tend to spend more time in backyards or neighbor comfortable being in the desert, because I've spent a lot of time in the desert before having kids
Safety Safety and Nature	10	comfortable being in the desert, because I've spent a lot of time in the desert before having kids
Time outside	5	have sunscreen protective clothing, water, um more than enough water. Then we think we'll need snacks um even anytime. We go on a extensive hike a first aid kit.
Safety Safety Tips	9	
Risk Risk Playground	7	risk on playground equipment. I It dawned in me that so many of the kids and my friends Peer Group have broken their arms or dislocated uh hip, and have ended up in the er urgent care.
Risk Risk Playground	7	

Safety Safety and Nature	10	Um, where we've spent so much time in playing in natural spaces on rock, out crops and hiking, and you know, down trees. And you know, maybe a scrape has happened, and and that's not to say that a kid couldn't have fallen and seriously hurt themselves.
Risk Risk Playground	7	realizing that what is deemed safe playground equipment in our group, that that was not the case, and I think the statistics it sounds like from some of the data you posted um support that that more kids hurt themselves calling off monkey bars or on trampolines, or some of the other standardized playground equipment.
Risk Risk Playground	7	And I think also um think about like the even the bottom of playgrounds versus when we were kids like they're all like rubberized it. It's almost like. Oh, well, if you fall i'll just bounce up, and that that's not the reality you fall in. You break an arm.
Risk Risk Playground	7	That's why I do that. Yeah. And then uh one day a kid fell funny during recess and broke their leg, or something like that. And after that we were never allowed to jump off, that,
Nature Play Nature Play Spcaces	10	Would they take less risks and not jump from, you know? Climb up to the top of a tree and jump off because you you inherently, you know it doesn't seem like It's been pre approved as being a safe.
Safety Safety and Nature	10	Would they take less risks and not jump from, you know? Climb up to the top of a tree and jump off because you you inherently, you know it doesn't seem like It's been pre approved as being a safe.
Risk Risk Nature	6	Would they take less risks and not jump from, you know? Climb up to the top of a tree and jump off because you you inherently, you know it doesn't seem

like It's been pre approved as being a safe.

Risk Risk Nature	6	<p>That's when you, you know, complete the task where in a tree most people don't climb to the top of the tree like we have a sumac in a in our backyard and my kids climate all the time. They're not at the very top of the tree they have their branch that they like to hang out with, and they're feel very safe, and you know I have kids two different ages, and the younger one wouldn't go as high when she was little, and you know she's caught up to Big Sister, and they kind of have their spot.</p> <p>That's when you, you know, complete the task where in a tree most people don't climb to the top of the tree like we have a sumac in a in our backyard and my kids climate all the time. They're not at the very top of the tree they have their branch that they like to hang out with, and they're feel very safe, and you know I have kids two different ages, and the younger one wouldn't go as high when she was little, and you know she's caught up to Big Sister, and they kind of have their spot.</p>
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Safety Safety and Nature	10	<p>That's when you, you know, complete the task where in a tree most people don't climb to the top of the tree like we have a sumac in a in our backyard and my kids climate all the time. They're not at the very top of the tree they have their branch that they like to hang out with, and they're feel very safe, and you know I have kids two different ages, and the younger one wouldn't go as high when she was little, and you know she's caught up to Big Sister, and they kind of have their spot.</p>

Nature Play Nature Play Benefits	7	<p>And I think not only does it help kids assess risk, but it builds confidence right?</p> <p>Um, they don't spend, so they spend time in our backyard by themselves, and as they've gotten older they will go to the park by themselves. They have some friends in the neighborhood that they can walk to. They can do bike rides in the neighborhood, but we're not um having them cross major streets on their own.</p>
Risk Risk Outside not in nature	3	<p>Um, but with little Sister, who is nine, we're still. You have free rain in the neighborhood to bike around or walk around. Go to the Park, but we're not having her navigate the major streets we haven't, and it's interesting to think about where I grew up. We didn't have the grid system.</p>
Risk Risk Outside not in nature	3	<p>So I spent a lot of time. We had a that really large park that also had a very expensive bike lane that I I mean. They they keep extending it. Um! But when I was a kid we could easily go six miles in one direction and turn around, and this park had this creek running through it, and I remember spending hours, and there were snakes swimming in the creek, and there was this big pipe that we would cross um, and it was probably a good I mean like fifty feet across, and you know I don't remember any of us ever getting hurt. We, you know this is back in the eighties. We had no cell phones. Our parents kinda knew where we were, as in in this huge park, but you know it was completely free rain. And you don't see kids having that same experience, at least not here in in Arizona.</p>
Parent time outdoors as kid	1	<p>But I remember being a while ago, that actually the you know, the rate of kidnapping or child Abduction is lower now, but the perceived risk is higher.</p>
Risk Risk Outside not in nature	3	

Social Media and Risk	1	<p>Um, be it to the news, or through social media, that I think we have this perception that it's much more dangerous out there for our kids. I don't know if you are familiar with the garmin um mini the checker. So I ended up getting one. I was going into the Grand Canyon during remote room, and there's no self service down there. Um! And so I think I It was a mother's day gift to me a couple of years ago, and I it's I don't feel I often don't even have it turned on half the like. If I go to South Mountain I forget it most of the time. Um, I do make sure I have a cell phone if i'm, you know running, especially if i'm running, you know, in the desert. But um, I I don't feel like It's a security blanket, but I do know that when you are in a very remote place like the Grand Canyon it was nice to it. It was nice to have it. Um, just in case something happened especially because you are so remote. There's no cell service. Um. And if you come across someone else, because that's often the case. Um, that you find someone else who's lost or doesn't have water or doesn't have food or electrolytes.</p>
Parent time outside	6	<p>Yes, and I think people often they buy this technology or the app, and they feel like, Oh, I can just be rescued within a second um, and and the reality is, if you're in a remote place, that that is not going to be a fast rescue, not to mention the cost to taxpayers, and oftentimes these rescue companies, it's volunteer base.</p>
Parent time outside	6	

Risk Risk Kids and outdoor time	1	<p>But there is a stereotype against, you know, single men, especially around schools and playgrounds, and so and also I mean, I feel that if i'm not being so low, especially if it's early in the morning. My spy senses are different than if it's a woman I come across on the trail or a family. Um! And so I would say, we have had the discussion with the girls about. You know It's it's the stereotype, the guy with the van who wants to give you ice cream and help you find his puppy, and I mean we've talked about those different scenarios not to scare them, but it's but just to make them aware that that's not someone um that you're gonna go hang out with. But then we've also had the conversation that Okay, a safe person, mom, with a stroller.</p>
Safety Safety Tips	9	<p>Okay, a safe person, mom, with a stroller. Chances are that's gonna be someone like. If something happens. If you're at the park by yourself. Um! And someone gets hurt. You can always go to. You know the mom with the kid.</p>
Safety Safety Tips	9	<p>That would be a safe person. Go to. And then you know also the the Fire People, the police. You know those community type workers,</p>
Safety Safety Tips	9	<p>I've never said Go to the single dude. That's you know, smoking pot.</p>
Safety Safety Tips	9	<p>They're not. Sometimes they're not good people, you know, and you have to be safe in whatever way that is.</p>
Safety Safety Tips	9	<p>Oh, this you know your friend's dad. He's a good person, you know if you need anything, he would be a good person to call, or you know, if you're at the park with him, it's absolutely fine. Um, But You're right like statistically. If it's a stranger, it's more likely going to be a male that's going to. You know cars harm than a woman.</p>

Safety Parent and Safety	6	<p>You know It's interesting because some of our Friends' parents are much more um safety have more safety concerns than my husband and I do, and it does change the vibe.</p>
Nature Play Nature Play Spcaces	10	<p>There was this big like rock outcrop that they loved, that that was the one that was deemed the ultimate playgrounds Immediately when we got there, and we spent much of the weekend with them out of sight, and we all felt very safe. But it was different. Families that, you know, have had different life experiences, and maybe didn't have interactions that would cause you to think that. Um, the chances of something unsafe happening were high. Yeah, and it's, I mean, i'm sure you've experienced the young kid that is fascinated by whatever insects via like those big would be their track and player, butterfly, or the kid that is interested. And then the mom freaks out because it's a B or whatever. And then instantly the Kid is terrified of the bees, and so like that one instant changes that kids whole perception of something in nature that can then last. And then that kid is scared of these for years and years and years.</p>
Nature Play Nature Play Fears	2	<p>. For a lot of reasons we talked about It builds confidence. It allows kids to learn how to assess, risk um. And outside of what the parents team is risky behavior, they can kind of test their own limits, and then those limits can change as they grow and get more comfortable, being outside. Yeah,</p>
Nature Play Nature Play Benefits	7	

We were actually at Woods Canyon Lake, so doing, the five mile loop around the lake, and we had stopped to have a snack, and so my husband and the two kids were sitting on. It was, you know, this big rocket area. They were sitting on one spot I was maybe a few feet away from them, so we're talking at most five feet. Um! And I had the dog with me, and All of a sudden I saw the snake, the rattlesnake that was right between us, and again I didn't want, so our dog was new to us, so she had never seen a snake before. I didn't know how she would react, and I didn't want to see the whole thing with making your kids be scared of insects. I didn't want to freak out and have the kids freak out, but it was very much a um. Okay, we're gonna we're gonna get up slowly, and we're We're gonna back up um. And again like I've spent a lot of time in the northern desert. I've come across more rattlesnakes than I can count. I've never had, you know. I've never had a rattle. Snake bite me, but I know that's very possible. I have run across one and didn't realize. I literally stepped over one until it started rattling. Um, But I know like obviously that's a risk if you get bit by a rattlesnake it's it's bad news. Um, but we it's not like we've never gone hiking again, you know, and and we've seen battle snakes South Mountain, and we still go there all the time. Um, but it did give us time to talk about snake safety and and whatnot.

Risk|Risk Nature 6

Um, we have come, you know, like when you're hiking and someone sees a snake up ahead of the trail, and they tell you like Oh, by the way, there's a snake up there.

Risk|Risk Nature 6

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Safety|Safety Tips 9

you like Oh, by the way, there's a snake up there.

Safety Safety and Nature	10	Nothing ever happened. Um! And so I wonder if, by having lots of either neutral or positive experiences, you desensitize yourself to the risk
Safety Safety and Nature	10	I had lived here for years, and for me it was like this is the most exciting thing ever I mean. Even when I see a snake. It's like this is this is cool. But um also there's a risk.
Risk Risk Nature	6	I had lived here for years, and for me it was like this is the most exciting thing ever I mean. Even when I see a snake. It's like this is this is cool. But um also there's a risk.
Nature Play Nature Play Activitites	6	'm trying to think so. I guess I could say that camping trip we did in September when they were off, you know. Probably a good quarter of a mile from our campsite um climbing trees playing on rock piles they were building, you know, little forts out of branches and whatnot um, and it's again.
Nature Play Nature Play Activitites	6	rying to think there was one tree that they really enjoyed climbing,
Nature Play Nature Play Fears	2	Um! One of the So there are three families, one of the families we've camped with several times the other family. This was the kids first time camping Um, And I think it was really transformational for those two kids um to see other kids that feel safe in nature and um also their parents were really calm and relaxed, and um! I think their parents also allowed their kids to kind of experience nature in their own way, without being tethered to their parents, or, you know, holding their parents hand or what not.

Safety Parent and Safety	6	<p>Um! One of the So there are three families, one of the families we've camped with several times the other family. This was the kids first time camping Um, And I think it was really transformational for those two kids um to see other kids that feel safe in nature and um also their parents were really calm and relaxed, and um! I think their parents also allowed their kids to kind of experience nature in their own way, without being tethered to their parents, or, you know, holding their parents hand or what not.</p>
Nature Play Nature Play Benefits	7	<p>m, Yeah. So like climbing trees, that type of thing. Um, I've seen them crossing creeks either like jumping rocks or going on down logs. Um! And it's interesting to see with kids being three years apart in age, how there is a difference in how they assess risk, and when we've been um out, my older one tends to, you know. Make it across the stream faster, or you know, a few years ago the youngest one in it should make it halfway and say, Nope, i'm done um.</p>
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Safety Parent and Safety	6	Um So so so why? Why is that in particular, like some burns and dehydration? What about that concerning? Obviously we live in the desert? Um some, but there's not a lot of shade oftentimes, and when you're very engaged it's easy to forget to reapply. And so we do make a point. You know before the we're going out, you know, if we're going to a our breed them, or hiking, or or whatever it will apply. But um often it's the couple of hours later. It's like, Oh, yeah, we need to.
Safety Safety Tips	9	Um So so so why? Why is that in particular, like some burns and dehydration? What about that concerning? Obviously we live in the desert? Um some, but there's not a lot of shade oftentimes, and when you're very engaged it's easy to forget to reapply. And so we do make a point. You know before the we're going out, you know, if we're going to a our breed them, or hiking, or or whatever it will apply. But um often it's the couple of hours later. It's like, Oh, yeah, we need to.
Safety Parent and Safety	6	I feel like the more places that almost have like an introduction to nature play.
Nature Play Nature Play Spcaces	10	I feel like the more places that almost have like an introduction to nature play.
Nature Play Nature Play Spcaces	10	Um, I know, like I was heavily influenced by with at the desert Botanical Garden, that seedlings classroom had that backyard space, and even trying to incorporate some of those ideas into our backyard and say, Yeah, you can. I mean things as simple as like painting the wall with water rather than you know, setting up an easel with pain like his, or just as happy painting with water.

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Nature Play Nature Play Benefits	7	A hard moment I had during this study was the how many injuries that group of kids had had on standardized playground equipment.
Safety Parent and Safety	6	A hard moment I had during this study was the how many injuries that group of kids had had on standardized playground equipment.
Risk Risk Playground	7	A hard moment I had during this study was the how many injuries that group of kids had had on standardized playground equipment.

Nature Play|Nature Play
Benefits

7

Oh, there's a meal train coming, and he, and he was like. Do you think I can beat the new train? And he's like no like three miles is too far, and it was almost like. Watch me! And she took off, and the reality is, you can beat the meal trains. They they're not that fast, and they pause periodically, and she was the first one of our group out of the canyon, and it's like she. It's all she had. The Aha! Moment like this is this is cool. This is a beautiful place, and oh, no, that was. It was fun to watch her. Just have all of a sudden all this like self motivation and confidence.

Nature Play|Nature Play
Activitites

6

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Nature Play|Nature Play
Spces

10

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Nature Play Nature Play Spccases	10	The Grand Canyon is my favorite spot, Um, so it it's interesting. I Have you heard of the thousand hours outside? Um! So last year was my first year that I did it, and I got just shy of two thousand. So this year I kept track, and I made it to a thousand, I think, in July, and then didn't print off a new sheet. It was kind of almost like an exercise the first time to say, Oh, I wonder how much time I spend outside um, and but I will say printing off that sheet I was very conscious about. We did more dinners on the back porch rather than at the dining room table. Um! And I think it was almost just that little incentive to spend more time outside, because I knew I was keeping track. Um. So I would say I spend probably a decent amount, or definitely probably more than average
Parent time outside Nature Play Nature Play Spccases	6 10	
Safety Parent and Safety	6	South Mountain is my How do you raise them to be good people? How do you raise anyone to be a good person. So you know, Um, I would say, we probably spend at least some time.
Time outside Nature Play Nature Spaces defined	5 3	Well, do you define like our backyard being at the Park nature?
Parent time outside	6	I probably would say an hour to three a day. on average, probably half an hour to an hour every day, and i'm not counting recess.
Time outside Reasons to not to nature play Reasons to not do Nature Play	5 1	Um, I think laziness to get into the car and drive when it's so easy to just go out the door.
Reasons to not to nature play Overscheduled Nature Play Nature Play Benefits	1 7	m! And I think also being over committed with activities, and so like the girls also do Girl Scouts and dance. I think it allows them to be more creative.

Nature Play Nature Play Activitites	6	So it's kind of this ongoing um imaginary play that only happens when we're in the woods. Um, I think again, going back to that, we've had very positive experiences without any serious injuries that all of those individual experiences build on each other, and so I have a view that it can be very safe.
Safety Safety and Nature	10	Yeah, I think they were very clear. Um, I liked the little graphics so often like to go pictures. Um! But the messaging was clear. Um, i'm a data person so like the statistics, I feel like I was able to absorb very readily. I imagine most people would um find that effective as well Um, I did share a few with friends actually. Um some friends that mostly friends that we have similar mindsets about nature um or friends that we've camped with. So I a couple of them. I did pass on
Intervention Like	3	I felt like um validated your points um, which I like. I know um that's not as important to many people, but for me. It's nice to not just get be given the like piece of information.
Intervention Like	3	nature deficit disorder. m, I think it reinforced the idea that nature can be very safe if you do it smartly.
Intervention Like	3	Um, I think, going back to the idea that I've spent a lot of time in nature, and so by having that experience. And so I think this mindset that customer in desert is dangerous is present in a lot of families.
Time outside	5	So why is a bird's nest considered nature and a house isn't um, and I mean, there's a whole area of urban ecology, which is, it's almost a disservice to discount cities as not being part of nature. It's our it's our in nature that is definitely, heavily and feel influenced by humans. But um,
Safety Safety and Nature	10	
Parent time outside	6	
Risk Risk Nature	6	
Nature Play Nature Spaces defined	3	

I think that's a viewpoint that a lot of non ecologists probably Don't have.

Nature Play Nature Spaces defined	3	And I mean honestly in the city. There's higher biodiversity in people's yards than we have in the native desert because they plant so many things. So yeah. And it's also interesting to think about like going back to like who participated in the study like people that are already members of like the Desert Botanical Garden boys, Thompson, even even the Zoo, are probably more I inclined to introduce nature to their kids than people that have membership to Lego Land, or I don't know whatever other type. If they're the ones that go to Disneyland versus you know more national parks, or what
Risk Risk Playground	7	I think one was the safety one, because I, her child, had broken his arm on a monkey bar, and it was like, Oh, look at this um one I shared with a mom. So I actually had was gonna share your study with her. But her kids were too young. Um, yeah, I think Nature, I've noticed for me helps me feel like more present, more grounded if it's been too long since I've been on dirt since I've been like on a trail somewhere.
Parent time outside	6	It can be both honestly. But in my experience that it's uh been generally safe
Safety Nature Safe	4	Um. So I mean. Obviously my perceptions dictate uh kind of what my kids are allowed to do, and the kind of experiences that they have. Um, But because I perceive this northern desert to be safe. My kids have um had lots of opportunity to explore and play in the Sonoran desert. Okay,
Safety Nature Safe	4	

			We prepare as much as possible. So we um, you know, know, and learn about um the environment, and what kinds of supplies or preparations that we need to do or have um to in that, you know, helps with uh feeling safe and staying safe while enjoying the desert. Um, So we, you know, obviously like, have an adequate amount of water and clothing sun protection. Um, An aware like teaching them an awareness of uh snakes or insects that could be medically significant.
Safety Safety Tips	5		mean excessive temperature probably would be too risky if it was uh like a very hot day
Risks Risk Nature	6		um like active rattlesnakes.
Risks Risk Nature	6		temperature and and rattlesnakes.
Risks Risk Nature	6		pretty adept at um like knowing their physical limitations and kind of how to see if an area they're playing in is safe and matches their comfort level.
Risks Risk Nature	6		pretty adept at um like knowing their physical limitations and kind of how to see if an area they're playing in is safe and matches their comfort level.
Safety Nature Safe	4		I do have family members who are maybe not as comfortable as I am with risky play or with um. And so they, you know, maybe would tell my kids to avoid something, or to be careful.
Safety Adults overly safe in Nature	4		And also we do. We do keep an eye out um for maybe unsafe uh people when we're out.
Safety Safety Tips	5		Um, like if it's, you know, if we're, if we're with um, you know, because we do a lot of of outdoor experiences with my grandma, and so my grandma might, um, you know. Tell them not to do something, and that I will just kind of um respectfully let her know that it's something that i'm comfortable with, and that my kids can continue with what they were doing.
Safety Adults overly safe in Nature	4		

Risks Risk Nature	6	My son, lost his grip on the rock and fell and knocked the mom down, and she, like cut up her legs. And so that made me feel uncomfortable in that um you know my like that. I was worried that she was going to um, you know, like be upset that I wasn't more in control of what my my son was doing. Um, but it ended up to be really a non-issue
Risks Nature Incident	2	My son, lost his grip on the rock and fell and knocked the mom down, and she, like cut up her legs. And so that made me feel uncomfortable in that um you know my like that. I was worried that she was going to um, you know, like be upset that I wasn't more in control of what my my son was doing. Um, but it ended up to be really a non-issue Yeah. So no, she was very cool and understanding of um. You know that he was learning about his body in that moment, and thought that he could do something that he wasn't quite ready for um. But I was more, you know, concerned about how how she was going to feel in her um. Then, you know, like the physical risk of it.
Nature and Lessons Learned	3	There were some other adults present who just kind of made sure that um the kids who were still climbing. We're still climbing safely.
Nature Play Nature Play Activity	10	and we got her like she needed a band aid um, and so we did that.
Risks Nature Incident	2	and we got her like she needed a band aid um, and so we did that.
Risks Nature Risk Reaction	1	
Nature Play Nature Play Activity	10	love to climb trees, And um, you know, they like to try to see how high they can get and jump out of the trees. And um, you know, play castle and swords with sticks and stuff, and obviously uh stick play can be a little bit risky. Um! So that's something that uh a risk an outdoor risk that they take pretty regularly is is fine in trees.
Nature Play Nature Play Activity	10	

Nature Play|Benefits of Nature Play

5

learning about their their own bodies and their own physical um capabilities and limitations. Um! And how they kind of exist in space, and you know what's around them, how they're learning the if um you know like, if the tree branch is going to be large enough to support them, or if it's, you know, gonna if or if it feels sturdy, or if it feels brittle um, I think that they're also uh, especially when they're clients with other kids that they're learning how to interact with.

The other kids who are present and how to kind of occupy the same space with other people, and how they need to um be in control of their bodies. Um, in regards to other people who might need to be sharing the same space. Um also obviously learning about like height, and how height different heights make them feel. And um uh, you know, probably depending on the type of tree. If there are thorns that they need to be aware of, or if it is a tree that um, you know, might be poisonous or something like that?

Nature and Lessons Learned

3

The other kids who are present and how to kind of occupy the same space with other people, and how they need to um be in control of their bodies. Um, in regards to other people who might need to be sharing the same space. Um also obviously learning about like height, and how height different heights make them feel. And um uh, you know, probably depending on the type of tree. If there are thorns that they need to be aware of, or if it is a tree that um, you know, might be poisonous or something like that?

Nature Play|Benefits of Nature Play

5

hose observational skills, you know. Sensory skills, you know, doing, you know, cause and effect evaluation. So it's. It really provides a lot of opportunity.

Nature Play|Benefits of Nature Play

5

Intervention Like	3	uh the ones where it was kind of like in in the Fort building area, though, with those images.
Nature Play Nature Play Activity	10	with like the big rocks like the big um boulders. Yeah, we They've also done that potion making so like finding, you know natural materials. Um! And seeing how they can like, mix them or combine them um, or they like to make um, you know, like mud pies and uh flower crowns and all that kind of stuff.
Nature Play Nature Play Activity	10	so much fun, you know, and and kids get really into it like so much part of dramatically.
Nature Play Nature Play Activity	10	can play with the eight year old, and they all have kind of a role they love to play like castle, and so they'll build. We go out to. I don't know if you're familiar with the frog pond over off of Tatum um.
Nature Play Nature Play Activity	10	
Nature Play Nature Play Spaces	14	f Tatum um do a hike back into a pond, and there's like this amazing um little grouping of trees.
Nature Play Nature Play Spaces	14	It's just whole dynamic um play where they're, you know, pretending to be different characters, and they make uh, you know somebody is hungry or injured, and so they make like a a healing potion, or they make a stew, and and everyone um the different ages can all play together. That's one of our favorite places to go.
Nature Play Nature Play Spaces	14	It's just whole dynamic um play where they're, you know, pretending to be different characters, and they make uh, you know somebody is hungry or injured, and so they make like a a healing potion, or they make a stew, and and everyone um the different ages can all play together. That's one of our favorite places to go.
Nature Play Nature Play Activity	10	

Fears Nature Play Fear	5	<p>Probably my biggest concern is that there um would be like an injury that I am not prepared to handle, and I usually have all four of my kids with me, and it's usually just um</p> <p>more serious injury, or to um break up a bone or something, and I I think that that would be a lot for me to handle um by myself, trying to manage all of the kids. I have a world and a three year old trying to manage by myself or the diapers in the in that cabinet in the back, or do I my car? Okay, Um. And then you know how to navigate uh treating it for get somewhere that we need to get uh by myself. Did you find diapers</p>
Fears Nature Play Fear	5	<p>There you go?</p> <p>cary um, cause it's like, you know. I I need you to help, but I can't. But there they just want to run and play, or they're they're really big emotions. So yeah, my year old is is wild and has no fear. And so you know, my one of my fears is that I would be like busy helping. You know the an injured child. And then my one year old is gonna, you know, dive into the pond, or like uh hop off a cliff or something.</p>
Fears Nature Play Fear	5	<p>So when we were first when when I was first starting um to get out with my kids. More, I really wasn't sure what I was capable of, like what I could handle on my own.</p>
Fears Nature Play Fear	5	<p>And so what I found very helpful was joining um like classes, or I joined a really cool group called Mother Hiker Um, and every Wednesday we did a toddler friendly hike, and so I think that the um not only that I didn't have to um like, make a decision about where we were going to go,</p>
Fears Nature Play Fear	5	<p>rails around Maricopa County um were accessible for my toddlers at the time, um, and uh, And so I think that having</p>
Nature Play Nature Play Spaces	14	

like a like a plan, or like a like a list of these, are toddler, friendly.

Safety Safety Tips	5	like a group of people of moms going together.
Safety Adults overly safe in Nature	4	She lived in a multi generational household, and so she was very, very cautious. But it's definitely got a little bit more of an educational slant than just getting outside and having a, you know, good, playful experience, you know, and cat. I absolutely adore Kathy and her class that we do with her. It's really such a good combination of um like educate, like an educational aspect, but also the kids get uh so much time during the class to free play and explore and find trees, and you know um play
Nature and Lessons Learned	3	But it's definitely got a little bit more of an educational slant than just getting outside and having a, you know, good, playful experience, you know, and cat. I absolutely adore Kathy and her class that we do with her. It's really such a good combination of um like educate, like an educational aspect, but also the kids get uh so much time during the class to free play and explore and find trees, and you know um play
Nature Play Nature Play Benefits	6	Um, really for me, uh just watching my kids, especially when we first were doing that hiking group. It made me realize that my kids were capable of a lot more than I had previously known about them, and so it gave a really cool opportunity for them.
Nature Play Nature Play Benefits	6	Um, you know, do what they were comfortable with, and what they showed me they were comfortable with um was a lot more than I had assumed about them.
Nature Play Benefits of Nature Play	5	

		Um, I think that it just gave me a lot more confidence in their ability to manage their own risk taking, and so that I didn't need to be so involved in in the decisions that they were making in outdoor play, or even in play in general, or honestly, just like in in life and parenting in general. It gave me a lot more um confidence in them as humans, and and showed me that they um just are really able to assess and manage, risk and know, like they're so capable of of knowing what they're comfortable with, and and so that affected um. You know their play by me stepping back and giving them the freedom to make their own choices while they play um, you know, and and also um What they were able to learn and understand has just been um so much more rich than if we had not had these experiences
Nature Play Benefits of Nature Play	5	
Nature Play Nature Play Spaces	14	Thunderbird Conservation Park
Nature Play Nature Play Spaces	14	Dean Hills recreation area.
Nature Play Nature Play Spaces	14	South Mountain. different lakes up in Prescott we go to Bold Water Lake. Um. The gold water is probably our favorite lake to go to up there. Um. And some of the different like creeks and stuff in Yabopai County. Um, we uh! Where else do we go? We go to the Zoo, but I don't know if that counts um, you know they they actually a really good nature base, but a thorough ranch park, and I love the World Ranch Park because they have um like they have the playground which I you know of. Avoid, if it all possible, because I just I really don't love the whole playground experience, but they have the side of the park that has the citrus
Nature Play Nature Play Spaces	14	

groves and the gray and the rose garden,
and we often go over there.

Nature Play Nature Play Activity	10	And so the kids just get to run around and observe all the different kinds of trees, and the different birds and peacocks and stuff over there, You know more of a like a nature location. We go to through our ranch because it's still outside. They're still getting to um, you know. Engage with a a natural environment, and they have the
Nature Play Nature Play Spaces	14	whole section of the
Nature Play Nature Play Spaces	14	North mountain,
Nature Play Nature Play Spaces	14	excluding saguaro Ranch, probably once a week.
Time in Nature	3	excluding saguaro Ranch, probably once a week.
Time in Nature	3	nature at least two times a week and and a very familiar space, Um, but we have like a huge dirt mountain that my husband he he dug like a huge pit, and then built up the sides of the pit. And so it's like this big kind of mountain with a deep hole in the middle, and that he made for them. And so they in in my backyard. Um! They play for at least um two to three hours outside every day.
Nature Play Nature Play Spaces	14	I'm: So So the location, like our physical location within the city limits, or I'm:
Nature Play Nature Play Spaces	14	not.

Risks Risk Nature	6	you know, any given week like the you know, or the temperature, or what else we have planned.
Nature Play Nature Play Spaces	14	But yeah, definitely, a location would impact our our access to it just in regards to drive time because we are in the middle of the city
Parent time outside	1	i'm outside most of the time that my kids are outside, so it probably two to three hours a day
Safety Safety Tips	5	or especially my one year old, he wants to be wherever the big kids are, but he is definitely not um able to safely play unsupervised. So most of the time that my older kids out or outside I am also outside.
Time in Nature	3	or especially my one year old, he wants to be wherever the big kids are, but he is definitely not um able to safely play unsupervised. So most of the time that my older kids out or outside I am also outside.
Nature Access	1	Um, probably just uh like getting to different nature like locations. Um, the precious Princess um, just the you know, Like packing up and making sure we have what we need and driving there would be our our biggest barrier.
Nature Play Nature Play Benefits	6	with more access and exposure to nature, are able to um regulate their emotions uh better, and that they also develop more of a you know, like some of those executive functioning skills.
Nature Play Nature Play Benefits	6	Just have that awareness of and make decisions about how to interact with what's around them.
Nature Play Nature Play Benefits	6	um for all kinds of for you know, for brain development for physical development, emotional development. Um. And And I think that it has a really uh strong impact on um like academic ability as well. Yeah,
Nature Play Nature Play Benefits	6	on my perception of safety outside Um. So I think that that our increased exposure to Nature has given me

definitely a a more positive um
perception of what was of nature

Safety|Nature Safe 4
Nature Play|Nature Play
Activity 10

eah. So just our um, you know,
increased experiences with nature has
has given me a more positive perception
of the safety of it.

But my bigger kids are are a lot more
adept at using tools.

Um, I think that the uh information um
was definitely well researched on a lot
of the stuff. There was different, like
sources and citations. Um! And so I
thought that that was helpful, that it was
presented that way for anyone who
wanted to to to look into some of the
stuff a little bit further. Um, and it um,
you know the credibility of this
information that was shared. Um, and I
thought that it was also engaging like
with the graphics and the pictures and
stuff that were shared

Intervention Like 3

My husband can have a little bit more of
a tendency to interfere out of um, you
know, wanting to prevent injury or stuff
like that, and so just um, and he thinks
that i'm a little wild sometimes. And so I

Safety|Adults overly safe
in Nature 4

you just shared some of the stuff that
like, hey? Look, it's not. It's not just me
Well, yeah, I I know you sort of uh, you
know. You talked a little bit earlier
about like citations and and that stuff.

Intervention Like 3

But I well, I thought that the information
that it shared with relevant um to our
environment into the experiences that I
that the people in the study are having.
All of this stuff that shared is are things
that I already practice like with that out
in nature.

Not change behavior 2

Oh, it's not just my crazy, barefoot wife?
Um, that just to you know. See that
there, you know, like lots of
documentation and sources. And um,
other people who are out there with
these same beliefs and habits

Not change behavior 2

Safety Safety Tips	5	Yes, uh, and Why is that? Um, I think that this information can go a long way to address some fears.
Benefits of intervention	1	And so I think that the the the information um could definitely help some people who are not so confident to, uh find some more confidence
Safety Nature Safe	7	feel that it is safe.
Safety Safety Tips	7	m, as long as you take the precautions, and knowing that you're going into wildlife. Um at the right timeframes, then it will be safe
Safety Safety Tips	7	think it just shows that. Um, you know you have to be aware of your surroundings and um, but also have a good time and enjoy nature
Safety Nature Safe	7	e uh capable of being aware of their surroundings. Um! We always there's going to be, you know, steaks, rocks, and uh, you know items that be on the ground in our house we have, like the skeet trees which have thorns all over all. So you just
Risk Nature Risk	7	ng that makes me feel uncomfortable is when they take their shoes off. For some
Risk Nature Risk	7	rea
Nature Play Nature Spaces	4	at a local park. I kind of le
Nature Play Nature Play	6	tree climbers. So anytime
Activites	6	.Participant C: Um: Oh, yeah. During
Time Outside	4	the winter, probably
Fears Fear of animals	1	far as snakes and scorpions, you know, wildlife, that's out t
Nature Play Nature Play	7	em to be able to get energy out. Um,
Benefits	7	especia
Nature Play Nature Play	5	Um no,
Perceptions	5	mean it would definitely cause them to be, you know, a little bit more um just aware who's around, but other than that?
Safety Nature Safe	7	No, it would affect their playtime
Safety Nature Safe	7	mean it would definitely cause them to be, you know, a little bit more um just aware who's around, but other than that?
Safety Safety Tips	7	No, it would affect their playtime

Safety Nature Safe	7	<p>m, I will bring lots of water. Um Gatorade snacks, Flashlights um always have to wear specific shoes and clothing. Um, Also, you would want to bring any type of like first aid kit along with you. Um, and maybe some bug spray, some sunscreen to stay protected from the sun. Yeah, that's yeah, possibly like a pocket knife to just just in case there's anything you need to use that for, Um, I will bring lots of water. Um Gatorade snacks, Flashlights um always have to wear specific shoes and clothing. Um, Also, you would want to bring any type of like first aid kit along with you. Um, and maybe some bug spray, some sunscreen to stay protected from the sun. Yeah, that's yeah, possibly like a pocket knife to just just in case</p>
Safety Safety Tips	7	<p>there's anything you need to use that fo You know a lot of information about what to look for as far as snakes and scorpions, you know, wildlife, that's out there that could be roaming around um so definitely. Prepare them, as far as communication goes,</p>
Nature Play Nature Communication	7	<p>Um, yeah, it can be. But I guess it depends on where you go Um, there are Yeah, there could be times where it could be too risky whether they're, you know, rough housing around tumbling stuff like that is probably not a safe weighted to, you know, Do stuff in the in the desert or in outdoors</p>
Safety Nature Safe	7	<p>o you just need to be aware of those kind of things hanging out, and if you're rough housing around, then it's gonna be, You know, you could definitely run into one of those.</p>
Risk Nature Risk	7	
Safety Nature Safe	7	

			Um. And you're saying no adults or it just other adults right? Just know right now. No adults being outside no adults. Uh Yeah, that would probably, if there was no adults, it would probably cost up to be maybe a little bit more risky for sure. Maybe like jumping on tables or doing things they know they probably wouldn't do if an adult was around.
Risk Adult Risk	1		Um, I think, for kids especially. It allows them to be able to get energy out. Um, especially if they have been in school all day. Kind of helps release some of that energy that they've built up. Um! It's great exercise, and you know, getting some sun in your life always helps, you know a human body for sure. I kind of let it slide a little bit, because usually they're playing in the sand, which is usually Normally, it's going to be safe. Um. But if you were out in a area we don't know then definitely shoes are not coming off their feet definitely, because you never know what's out there
Safety Safety Tips	7		I kind of let it slide a little bit, because usually they're playing in the sand, which is usually Normally, it's going to be safe. Um. But if you were out in a area we don't know then definitely shoes are not coming off their feet definitely, because you never know what's out there
Risk Nature Risk	7		I kind of let it slide a little bit, because usually they're playing in the sand, which is usually Normally, it's going to be safe. Um. But if you were out in a area we don't know then definitely shoes are not coming off their feet definitely, because you never know what's out there
Safety Nature Safe	7		Um, I think they like it because of They kind of get a different perspective of nature up in the tree. Um, because you're looking down on things, and you kind of got that bird's eye view. So I think that's why
Nature Play Nature Play Benefits	7		Um, I'd see in the winter definitely like maybe two two days a week, maybe yeah, two days a week
Time Outside	4		m, like? Yeah. Well, I guess like just injuring themselves, whether it's a scrape, or a you know bomb for a
Risk Nature Risk	7		

hopefully no broken bones or anything like that ever.

Nature Play Nature Play Perceptions	5	Um, just because I feel like uh Nature should be a fun. Exciting time and being playing outside should be fun, not crying and sad
Nature Play Nature Play Access	3	I guess I don't really have any, I guess, because I think that our we get a lot of that freedom, and we have a lot of places that we like to go, and um, I guess I wouldn't have any comment on that one
Nature Play Nature Communication	7	t does put them in a really good mood at the end of the adventure. Whatever we decide to do, it really gets them into a positive attitude
Nature Play Nature Play Benefits	7	Um, no, no, not necessarily just that. It does put them in a really good mood at the end of the adventure. Whatever we decide to do, it really gets them into a positive attitude
Nature Play Nature Communication	7	um it definitely, as far as being a mother goes, helps with the flow of, you know, raising children, and it just helps everybody be in a stable, happy mood all the time
Nature Play Nature Play Perceptions	5	m it definitely, as far as being a mother goes, helps with the flow of, you know, raising children, and it just helps everybody be in a stable, happy mood all the time
Nature Play Nature Spaces	4	it just, you know, makes me want to plan out more trips, and for in places that we've never been, or nature spots that we've never, you know, explored yet. It just it definitely puts more um for future plans. It helps to, you know.
Safety Safety Tips	7	Want to go new places
		makes me want to plan out more trips,

Nature Play Nature Play Activitites	6	Well, I honestly our backyard is one of our favorite places to go, and we have kind of transformed it into, you know. Um, we grow seeds, and we watch the birds, and we watch for wildlife just in our own backyard. So I would have to say that's probably one of our favorite places. Is our home
Nature Play Nature Spaces	4	Well, I honestly our backyard is one of our favorite places to go, and we have kind of transformed it into, you know. Um, we grow seeds, and we watch the birds, and we watch for wildlife just in our own backyard. So I would have to say that's probably one of our favorite places. Is our home
Time Outside	4	well around this timeframe definitely in the fall. Here in Arizona we play, I mean, every day we'll be out there in the evening times, and when the kids get home from school we'll be out there all the time after school
Nature Play Nature Play Activitites	6	and we're trying to get some trees back there that grow really tall. So, hopefully they'll be able to climb those not just the ones in the park.
Nature Play Nature Play Access	3	and we're trying to get some trees back there that grow really tall. So, hopefully they'll be able to climb those not just the ones in the park.
Nature Play Nature Play Activitites	6	You can watch things bloom. It's just as far as sensory goes. It's really good for there, for their knowledge and learning more about trees and birds, and that kind of stuff
Parent Time outside	1	um. I usually am outside as much as my uh. You know my between work and just regular errands that I have to do for the family. I will go outside constantly for sure, on average, probably like Yeah, seven days a week at least two to three hours a day.
Nature Play Nature Spaces	4	I definitely like the um riparian preserve in Gilbert.

Nature Play Nature Play Activitites	6	Um, there is, I mean, there's just tons of wildlife. You can spot a hummingbird to uh, you know all different kinds of things out there um days a week. They probably spend like three to four days out of the week outside, and by I mean as far as hours, so I don't know, but at least that much Um! If it's too hot. It's harder to, of course. Go out there. Um! Or if it's well, if it's raining, we like to go out there, that's for sure. And so I guess maybe weather
Time Outside	4	Um, just because if it is too hot. Um, it's just, too. It's not enjoyable at that point, or if it is storming really bad, and the wind is really bad, it's it's not very enjoyable when you're having to deal with wind.
Risk Nature Risk	7	Um, I think that it um. I really think that it will help with um. You know I I I think I go back again on that energy. They, my kids, especially, have a lot of built up energy, especially once sitting in the desk, and you know, reading books all day, and it just helps to release some of that energy that has been, you know, sitting there for the whole day. So it really just helps them to be um in a happier mode at the end of the day
Risk Nature Risk	7	I think it's important, because the um will be able to, you know, have memories of being able to, you know, enjoy nature and stuff like that so definitely. It's important due to their growing up in their memories and stuff of being outside a lot.
Nature Play Nature Play Benefits	7	Yeah, you know, because they, you know. Maybe we'll spend more time outside of nature, you know, later on. Yeah, you know, because they, you know. Maybe we'll spend more time outside of nature, you know, later on.
Nature Play Nature Play Benefits	7	
Nature Play Nature Play Benefits	7	
Nature Play Nature Play Perceptions	5	

Intervention Like	3	Because it just helps people to understand nature a little bit better, and see what other kind of things that they can actually kind of do in nature. And it's just good for um learning purposes
Nature Play Nature Communication	7	Because it just helps people to understand nature a little bit better, and see what other kind of things that they can actually kind of do in nature. And it's just good for um learning purposes I think it's important for them to just be aware of. You know the different scenarios there, and and they were actually interested in it. So they kind of went along with me.
Safety Safety Tips	7	I think it's important for them to just be aware of. You know the different scenarios there, and and they were actually interested in it. So they kind of went along with me.
Nature Play Nature Play Perceptions	5	My daughter liked looking at all the pictures and um trying to see exactly what the key points were of each post
Intervention Like	3	My daughter liked looking at all the pictures and um trying to see exactly what the key points were of each post
Nature Play Nature Communication	7	I think that there was a lot of information, and you know um just good information
Intervention Like Nature Play Nature Communication	3 7	just good information I think that it didn't necessarily change anything, but it just does make you um, you know. Think about it, and and know what percussions are, and all that kind of stuff, and see what other people think about it. Just kind of a cool way to understand it differently,
Intervention Not Change behavior	1	Um, just so that they know what's uh you know what to look for safety precautions, all that kind of stuff, What to be aware of
Nature Play Nature Communication	7	Um, just so that they know what's uh you know what to look for safety
Nature Play Nature Play Benefits	7	

			precautions, all that kind of stuff, What to be aware of
Other Adult perceptions of nature	1		Um, just so that they know what's uh you know what to look for safety precautions, all that kind of stuff, What to be aware of
Nature Play Nature Play Access	3		Um, just to you know. Be just get out there, Get out there and take a walk. Do you know, do some exercise in nature? It's definitely good for the for the mind and the soul and um just that. Um, you know, being a part of your study. That's pretty. It's pretty awesome to see the information that was put out, and see how many people like to, you know. Have that type of um information. And yeah, pretty awesome.
Nature Play Nature Play Activitites	6		Um, just to you know. Be just get out there, Get out there and take a walk. Do you know, do some exercise in nature? It's definitely good for the for the mind and the soul and um just that. Um, you know, being a part of your study. That's pretty. It's pretty awesome to see the information that was put out, and see how many people like to, you know. Have that type of um information. And yeah, pretty awesome.
Safety Nature Safe Risks Nature Risk	3	7	One word safe uh playing a little more. particularly the heat.
Safety Nature Safe	3		They get to spend a lot of time in the southern desert A lot of time outdoors. Um Some degree of freedom. I probably need to become as a parent a little more comfortable with accepting how safe it is, and that, giving them a little bit more freedom even than they have
Risks Nature Risk	7		They get to spend a lot of time in the southern desert A lot of time outdoors. Um Some degree of freedom. I probably need to become as a parent a little more comfortable with accepting how safe it is, and that, giving them a little bit more freedom even than they have

Fear Nature Fear	11	careful about the heat.
Safety Safety Tips	13	careful about hydration
		October, and then we on March, when the snakes are more active, which will bring a hiking stick and just certain trails I might avoid.
Safety Safety Tips	13	
Safety Safety Tips	13	water is a big one,
		But I don't let them go out alone yet, unless they're with you all the other kids, but not by themselves.
Fear Nature Fear	11	And things like the snakes and stuff and scorpions.
Fear Nature Fear	11	It's taking basic precautions and other than that.
Safety Safety Tips	13	And kids can climb and explore, and i'm really pretty comfortable with them doing stuff.
Nature Play Nature Play Activitites	5	Once I see they have the basics, and just have a good sense of limits and stuff.
Safety Safety Tips	13	
Safety Safety Tips	13	have some limits with heights,
		I think It's given them a great sense of independence and problem solving like they're able to, and not even just stuff outdoors, but just day to day, and they run into an issue at school or another kid, or something that they're better able to just calm down and think through it, because they've seen some other kinds of adversity, like where they've climbed up to something that was kind of scary back down, having to figure that out.
Nature Play Nature Play Benefits	8	Um, I I mean like sometimes, if we do things in groups with other parents, particularly my kids, were younger.
		There was kind of a push back between parent and their own comfort level.
Risks Other Adults Overly cautious	3	
Safety Safety Tips	13	The the stranger thing.
		actually dogs is one that I personally kind of worry about,
Fear Nature Fear	11	

Safety Safety Tips	13	<p>young person that had three rottweilers that they did not seem to have a good sense of control over, and I was thinking that that could get ugly pretty quick. I want to be that'd be some for my kids to was. If they were by themselves, i'd want them to have some kind of self defense thing for that. And really the dogs are a big part of it.</p> <p>I don't think it really impacts my kids too much. That's really more on me. I'm worried about it.</p>
Fear Nature Fear	11	<p>um I made little bit is I've been kind of studying this area quite a bit, and just. I know that there is significant mental and physical health issues from a lack of time outdoors, and a lack of connection and a lack of free play.</p>
Nature Play Nature Play Benefits	8	<p>And then, just even from a personal level, is, if you teach kids, the outdoors are unsafe, it really it kind of limits their future what they're going to be able to do and be comfortable with, and they can overcome that they can, you know, on their own, learn as they get older, but it's a pretty big barrier to not do that, and I feel they're just less prepared for life, and how to take care of themselves and handle difficult situations that come up.</p>
Risks Other Adults Overly cautious	3	<p>And then, just even from a personal level, is, if you teach kids, the outdoors are unsafe, it really it kind of limits their future what they're going to be able to do and be comfortable with, and they can overcome that they can, you know, on their own, learn as they get older, but it's a pretty big barrier to not do that, and I feel they're just less prepared for life, and how to take care of themselves and handle difficult situations that come up.</p>
Nature Play Nature Play Benefits	8	<p>if if we ran out of water, where do you see water? How do you find that in the center of desert.</p>
Safety Safety Tips	13	

Fear Parent Self assess fears	6	Uh, yeah, I mean, it's happened. I think, that the climbing thing in particular, from a very young age is them wanting to go higher than it made me comfortable. Me having to kind of check. Is this a realistic fear? Is it not?
Fear Parent Self assess fears	6	I mean, really it's usually they're not afraid. It's just more me that I tend towards kind of anxious, I think, being outside and pushing myself helps with that anxiousness.
Safety Safety Tips	13	I mean, really it's usually they're not afraid. It's just more me that I tend towards kind of anxious, I think, being outside and pushing myself helps with that anxiousness.
Safety Safety Tips	13	So just I think that I acknowledged, when I didn't do things as well as like, shut up and wasn't as well prepared. It's. It's pretty important, and just showing them that i'm going to make mistakes, and they should, too. But the key is to identify the mistakes
Nature Play Nature Play Activitites	5	Um, I mean just last weekend we spent time mountain biking and camping, and they set up parts of it by themselves. and started the fire. I went to a like
Nature Play Nature Play Activitites	5	playground that had a lot of more newer ones. There's more adventurous stuff, and it those i'm pretty open with them about just doing whatever they want. Is that
Nature Play Nature Play Activitites	5	I mean all all those things they definitely do. They're a little beyond the age for some of them like building things with sticks and stuff like that, but they feel they're beyond the age. I'd be perfectly happy if they did it into adulthood, but they don't just don't do that kind of thing as much. It's more structured play now that they was engaging

Nature Play Nature Play Benefits	8	I mean all all those things they definitely do. They're a little beyond the age for some of them like building things with sticks and stuff like that, but they feel they're beyond the age. I'd be perfectly happy if they did it into adulthood, but they don't just don't do that kind of thing as much. It's more structured play now that they was engaging That was how they got comfortable to the outdoors and enjoyed It was by going out and just building things with rocks and looking at sticks and chasing animals
Nature Play Nature Play Benefits	8	That was how they got comfortable to the outdoors and enjoyed It was by going out and just building things with rocks and looking at sticks and chasing animals
Nature Play Nature Play Activitites	5	That was how they got comfortable to the outdoors and enjoyed It was by going out and just building things with rocks and looking at sticks and chasing animals t's the biggest one is probably getting hurt and being by themselves and being able to get help. My second biggest is other people bothering or harming them, or just simply making them
Fear Nature Fear	11	uncomfortable with their presence. Um, i'm in a stranger one I don't really know it's just being protective. It's it's kind of strange that i'm well versed in the data, and how rare it is, and that stranger abduction is almost non-existent.
Fear Parent Self assess fears	6	Um, i'm in a stranger one I don't really know it's just being protective. It's it's kind of strange that i'm well versed in the data, and how rare it is, and that stranger abduction is almost non-existent.
Safety Safety Tips	13	Um, i'm in a stranger one I don't really know it's just being protective. It's it's kind of strange that i'm well versed in the data, and how rare it is, and that stranger abduction is almost non-existent.
Fear Nature Fear	11	Um, i'm in a stranger one I don't really know it's just being protective. It's it's kind of strange that i'm well versed in the data, and how rare it is, and that stranger abduction is almost non-existent.

Risks Nature Risk	7	Um, i'm in a stranger one I don't really know it's just being protective. It's it's kind of strange that i'm well versed in the data, and how rare it is, and that stranger abduction is almost non-existent.
Safety Safety Tips	13	Um, I think awareness, the the parents being comfortable with it and doing it, seeing the importance of it to make it a priority. nowadays just have incredibly busy schedules and kind of seeing that this is just as important as the other things you're doing for the future.
Nature Play Nature Play Access	10	I think there's kinda become like checklist for parents.
Nature Play Nature Play Access	10	Time And the parents comfort level seems to be the big thing for me is just, and parents being uncomfortable on structured activities to with with with a lot of parents That's probably one of the biggest things is they're kinda like What's the point. There's no goal. There's no It's just a race.
Nature Play Nature Play Access	10	
Nature Play Nature Play Spaces	9	parks, the playgrounds and stuff. They're using that. Some of them are so nice, and I like going to stuff myself. I like never see it before. It's like they have zip lines and all kinds of climbing walls, all kinds of wild stuff. But then as you get closer to the center of the city, there is sketchy people hanging around the parks. There is just don't seem very clean or hygienic, and I wouldn't so. So it's hard. There's parks close to everybody, but some people's parks probably are legitimately not as six. I don't think that's an it's unrealistic kind of concern with some of this harp.
Nature Play Nature Play Spaces	9	

Safety Nature Safe	3	<p>They're using that. Some of them are so nice, and I like going to stuff myself. I like never see it before. It's like they have zip lines and all kinds of climbing walls, all kinds of wild stuff. But then as you get closer to the center of the city, there is sketchy people hanging around the parks. There is just don't seem very clean or hygienic, and I wouldn't so. So it's hard. There's parks close to everybody, but some people's parks probably are legitimately not as six. I don't think that's an it's unrealistic kind of concern with some of this harp.</p> <p>They're using that. Some of them are so nice, and I like going to stuff myself. I like never see it before. It's like they have zip lines and all kinds of climbing walls, all kinds of wild stuff. But then as you get closer to the center of the city, there is sketchy people hanging around the parks. There is just don't seem very clean or hygienic, and I wouldn't so. So it's hard. There's parks close to everybody, but some people's parks probably are legitimately not as six. I don't think that's an it's unrealistic kind of concern with some of this harp.</p>
Risks Playground risk Nature Play Nature Play Spaces	3 9	<p>Pay Coast Park. homeless people, you know. I can have the teenagers still in parties, because there's too many people there.</p>
Risks Nature Risk	7	

Risks|Nature Risk

7

ust different music in the park just to get people to kind of see. This is different. We've cleaned it up. There's not, you know, broken boxes all over the place, so that's what I would really love to see is to make because we do have uh i'm at. There's probably some spots without this, but there is probably a decent park within a couple of miles of almost everywhere, with within. You know, the Metro area even pretty far into the suburbs, which is pretty incredible, but just some of them are really that usable the market hands part. I'm interested to see what's gonna happen, because they're remodeling it and cleaning it up and adding amenities. And i'm interested to see what they do to make it sort of sustainable as a place. People would go a little bit more and feel comfortable and safe, and it would be a pretty good model for the rest of it if they can figure that one out.

Fear|Nature Fear

11

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Risks Playground risk	3	<p>mean the Teddy Beach Park is one example where it was such a nice part, but it's like overrun.</p>
Nature Play Nature Play Spaces	9	<p>mean the Teddy Beach Park is one example where it was such a nice part, but it's like overrun.</p>
Nature Play Nature Play Spaces	9	<p>How do we provide resources to ensure that they get the help that they need? And then they come up to the Beach park, and I think people complain, and then they chase them out of there, and then they go back down into the river. It's just that's not a solution. That's kind of pointless cycle.</p>
Risks Nature Risk	7	<p>How do we provide resources to ensure that they get the help that they need? And then they come up to the Beach park, and I think people complain, and then they chase them out of there, and then they go back down into the river. It's just that's not a solution. That's kind of pointless cycle.</p>

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Nature Play Nature Play Access	10	<p>How do we provide resources to ensure that they get the help that they need? And then they come up to the Beach park, and I think people complain, and then they chase them out of there, and then they go back down into the river. It's just that's not a solution. That's kind of pointless cycle.</p>
Risks Playground risk	3	<p>you're going to be complaining an awful lot when you're can't even use your local park, or use the restrooms there, and then push to a different area that just doesn't have as much cloud or as much money, and that's tough.</p>
Nature Play Nature Play Benefits	8	<p>Just that you're comfortable handling what's thrown at you. You stay calm when faced with diversity. Just think your way through it. So it makes me kind of double down, and just want to spend more time and more priority on that</p>
Fear Parent Self assess fears	6	<p>uh one thing is continuously checking in with my family and make sure that we are not over scheduling that we have days. They can just do whatever they want. Kind of.</p>
Nature Play Nature Play Spaces	9	<p>Tempe Beach part, Yeah, there's a you know, just like a neighborhood park by my space. My house on that's maybe a mile away. They spend a lot of time um the to the bigger parks like my kids really like pay coasts, and uh one in Chandler with the train park. It's called Desert Free Desert breeze. So they like those um actually like running and biking in the canals a</p>
Nature Play Nature Play Spaces	9	

lot. And then we live within walking distance of South Mountain parks. That's by far. We spend most of our time is out at South Mountain Park.

Nature Play Nature Play Access	10	<p>It is a priority. I moved a year ago, and I was very insistent with the real sir, that we had to be within one mile of a trail head, an access point to cell phone park um looking at a map and showing the realtors and understand that'd be nice to have i'm like, Oh, it's not anything else I care about the number of bedrooms personally</p>
Nature Play Nature Play Access	10	<p>Just just because I see the benefits of doing it, and I know that if it's easy, i'm gonna do it every day, if it's even a ten minute drive It doesn't seem like a big deal, but I bet I wouldn't go half as often as I do having that, and the kids couldn't do it themselves if it's not a place that they can walk to um, so it can't drive and old enough to drive yet.</p>
Parent time outside Nature Play Nature Play Spaces	1	<p>I aim for a couple of hours every day, and even more than that, on the weekends. That's pretty much how I choose to spend all my free time</p>
Time outside	9	<p>South mountain park for sure, even just my backyard, I</p>
Time outside	2	<p>at least four to five days, Ideally seven?</p>
Time outside	2	<p>that i'd say at least twenty hours</p>
Fear Nature Fear	11	<p>The temperature is really the only barrier I can think of for us definitely.</p>
Nature Play Nature Play Access	10	<p>The temperature is really the only barrier I can think of for us definitely.</p>

Nature Play Nature Play Benefits	8	<p>Um, just seeing a lot of issues with kids being anxious and depressed and stress that way too young. It ages. And I think this is going to be necessary to counteract it. I think some of the things that happen with the lockdowns, and the fear that was instilled in the kids is gonna do some pretty significant damage to their independence and their confidence, and their ability to handle life successfully, moving forward. And I think that some time out doors is probably the cheapest, easiest, most effective, and most reliable way to counteract all of that. So I think it's really critically important.</p>
Nature Play Nature Play Benefits	8	<p>I mean, i'm seeing kids that are way too old for this, like nine, ten, eleven years old, dragging around stuffed animals and being like crushed if they can't find it, and just freaking out, and that's It's a good example of what you just said that this developmentally several years behind that should be four or five year old behavior.</p>
Fear Parent Self assess fears	6	<p>Uh it, the more I do it, the more comfortable I feel. So I have to do it myself, and I think it's good.</p>
Intervention like	5	<p>I do think so. I think it was. It was great, it was gentle, and it wasn't forceful, and it was sharing information, and not telling people what to do or what not to do, which I think is a very effective way of communicating information</p>
Intervention like	5	<p>I'm not a heavy social media. User So I didn't really have much of a platform to share it wider, or I would have. I think it'd be super helpful if I get that in front of people. But I just don't have enough experience with it even know how to do that.</p>

Intervention like	5	I think your graphics and everything that you did. It was incredible information, and almost like finding a partner that has a bigger audience that could re share all that like the Phoenix Zoom, for example. I mean, I think this would have a huge impact if you could get it in front of people that weren't as comfortable, and I think you would. It would also counteract some things. I can give you an example
Risks Other Adults Overly cautious	3	my coworkers said that they stopped hiking because they were too afraid of rattle snakes
Nature Play Nature Play Access	10	They're not gonna ever be comfortable. So it's just kind of how do you move past that? Right? I can say for myself that I Sometimes the Grand Canyon seems super dangerous, like people are constantly getting lost and rescued, but it's because I won't read every single story like i'm seeing one hundred percent of the issues that happen at the Grand Canyon. So it seems way more frequent. It's really just because it's
Fear Nature Fear	11	They're not gonna ever be comfortable. So it's just kind of how do you move past that? Right? I can say for myself that I Sometimes the Grand Canyon seems super dangerous, like people are constantly getting lost and rescued, but it's because I won't read every single story like i'm seeing one hundred percent of the issues that happen at the Grand Canyon. So it seems way more frequent. It's really just because it's
Risks Nature Risk	7	They're not gonna ever be comfortable. So it's just kind of how do you move past that? Right? I can say for myself that I Sometimes the Grand Canyon seems super dangerous, like people are constantly getting lost and rescued, but it's because I won't read every single story like i'm seeing one hundred percent of the issues that happen at the

Grand Canyon. So it seems way more frequent. It's really just because it's

Intervention like	5	I liked how it was displayed, and I think that helped me to articulate it to my family and kind of reassess. Probably the the people. Some of the things checking in around the the really minimal risk that people presented was the most helpful for me. A lot of the rest of it. I I didn't have significant concerns about that, really
Intervention like Nature Play Nature Play Access	5	This is it's really important for the future of our entire community that that people have this. If people aren't comfortable, they're not gonna care if they develop these spaces so they're not gonna care what happens to them. If they don't appreciate it and understand it and see the value.
Not change behavior	1	t over scheduling that we have days. um, probably not a lot just. I was already fairly comfortable with it.
Fear Parent Self assess fears	6	Some of the things checking in around the the really minimal risk that people presented was the most helpful for me Yes, I think it is vastly critical that it gets in front of people, but the hard part is, for you know how to get it in front of people that don't think they're interested in this, or are ignoring it, because they're the ones who really need it.
Nature Communication	1	both of my children are extremely cautious and still, despite their ages
Risk Kids Risk	4	will rarely play outside of my sight (inside or outside).

Risk Kids Risk	4	they insist that I am outside with them if they are outside
Indoor play	1	o when they aren't in school and I need to work, they usually do Legos or some kind of imaginative play in the adjacent room where I'm on the computer - only because I insist they can't be in the same room while
Risk Kids Risk	4	I just wanted to clarify that I would be totally comfortable with them playing outside alone or engaging in risky play outside, they are the ones who seem uncomfortable with it.
Nature Play Nature Play Activitites	1	My own kids do things like climb trees, jump from heights, use tools, etc,
Nature Play Nature Play not in neighborhood	2	ut not out in the neighborhood a
Nature Play Nature Play not in neighborhood	2	don't see other children out playing.
Nature Play Nature Space	4	We live in a town home in an area with landscapes that are very manicured.
Nature Play Nature Space	4	children more "into nature" example walking up a wash or driving to a park/natural area.
Nature Play Nature Space	4	We don't typically play with most of the other children in the neighborhood who are mostly in school rather than homeschooled and I have put effort into developing friendships and community with other parents and homeschool groups who support more unstructured/nature/risky play
Nature Play Nature Space	4	My kids went to full blown Forest School in Canada and Washington state since my oldest was 2.

Nature Play Perspective on Nature Play	1	We are definitely not the "norm" when it comes to our views on how children play, how much outside time kids should get, schooling, risky play, child led learning, conscious parenting, positive parenting, et
Safety Safety Tips	3	More about interacting safely with other people children may encounter, risks to be aware of
Intervention Intervention Like	1	More about interacting safely with other people children may encounter, risks to be aware of
Nature Space	3	Some locations that are not too far of a drive, where we could play.
Nature Space	3	Information on local groups, locations that promote nature play
Nature Space	3	I think a chance to interact with other parents (either virtually like a message board, or in person) would have been helpful.
Fear Kids Fear	1	n my specific case, my children are the limiting factor- they are much more fearful and cautious than I am, and mostly will not go further than 20 feet from me. I'm interested in strategies for working with overly cautious kids.
Safety Safety Tips	3	Since joining the survey we have moved to a new house with a large backyard and backs up to more wilderness desert areas, thankful for tips for risky play

Intervention Intervention Changes	4	In this survey, I would suggest amending the questions related to "your partner," as not all parents have partners. It could include a grandparent or any other person who is a significant caretaking role, or have the option to select "I am the only person with a significant caretaking role of my child/ren."
Intervention Intervention Changes	4	Participating in this study honestly made me fairly depressed.
Nature Access Kids and technology	1	My kids are 6 and 9, and this is the year that they became much more self-directed and also started spending way more time on screens.
Nature Access Parent and kids not outside on screens	1	spend time outside without them, because it's where I like to be, I want to respect their choices, and other than imposing screen time limits (the second choice is usually legos or reading) don't have any great strategies for getting them outside more.
Intervention Intervention Changes	4	or future studies of parent perceptions, I might recommend recruiting a participant pool of parents of younger (2-8 year old?) kids, when parents can have greater influence. Just my two cents. Thank you for the helpful posts and information. :)
Intervention Intervention Changes	4	The neighborhood questions are tricky because there aren't a lot of kids in near us.
Safety Safety Tips	3	The weather cooling has also helped with us getting out more again.
Playground Injury	3	more serious injuries (bumped head, cut to face) have happened on playgrounds

Playground Injury	3	y daughter has broken her arm falling off monkey bars, yet (knock on wood) hasn't sustained any injuries hiking miles and miles of trails in the Sonoran Desert.
Playground Injury	3	There is a study out of Australia that traditional play structures are 5x more dangerous than adventure playgrounds!! despise playgrounds. I wish they would all be removed and replaced with natural ones.
Playground dislike	3	
Fears of animals	2	Snakes
Fears of plants	2	falling into cactuses
Fears of weather	1	the HEAT
Fear other	5	city dangers cooling towels and handheld mister fans
Safety Tips	8	help tremendously.
Fears of plants	2	Cactus,
Fears of animals	2	busy buzzing insects and snakes
Safety Tips	8	Ensuring awareness are an adventure! Packing a healthy lunch and plenty of water! Scoping out areas, and using a first aid kit!
Safety Tips	8	biggest outdoor play fear is that an injury will occur that is bigger than my first aid kit/experience is prepared for and that I will be scrambling with my 4
Fear other	5	kids (2 bei mostly that they have other kids to go with, are not going out alone.
Fear other	5	not being alone.
Risk Hydration	1	Enough water. Honestly the transient population is the biggest fear for the kids in our program as well as my own kids. Everything else
Fear People	1	I can plan and be prepared for. Not being fully aware of the dangers. Not knowing what to look for and not being prepared. My kid doesn't believe it, till she experienced it. Its not that I'm "lying" but she doesn't understand it till
Fear other	5	she's involved.

		am always asking parents to not say ewww, or act scared, or tell kids NO when the kids are exploring something that the parent may not like or be 100% sure of.
Parent Fears	3	I have seen kids show curiosity towards organisms only for the parent to freak out by a bee, spider, scorpion, ant, cockroach, etc.
Parent Fears	3	
Kids Time outside	8	20+ hrs a week and they are teenagers 60 families spend at least 4 hours outside each week.
Kids Time outside	8	10+ hours a week for sure!! In the fall and spring probably double that if not more !
Kids Time outside	8	aybe 10 hours a week in AZ summers? But probably 20+ hours/week during the rest of the year.
Kids Time outside	8	not enough.
Kids Time outside	8	I would say 10 hours. Nature to me is anything where we are surrounded by plants and animals, feel the ground that is not asphalt or pavers.
Nature Space	24	With contact to the earth. not nearly enough time is spent outside in nature, especially during the school year. However, we try to make up for it with camping trips, family hikes, trail runs etc everytime we get the chance.
Kids Time outside	8	, I easily spend 3-5 hours a week playing/running on trails
Parent Time outside	2	
Nature Space	24	Nature is natural. Not changed My kids probably spend 15+ hours/week playing outdoors during the summer and 25+ when it's nice out and we go on more/longer adventures.
Kids Time outside	8	I'm outside with them most of the time they are, but I usually read or play with the baby while the bigger kids play/create.
Parent Time outside	2	
Nature Play Activities	20	explore and have fun! Hiking, biking, camping, picnics - just being outdoors.
Nature Play Activities	20	

Nature Play Activities	20	Observing rocks, insects, birds and everything else that's surviving in the desert ! leave it better than we found it by cleaning up trash 🗑️; hiking 🥾 , camping 🏕️ , kayaking 🚣 , biking 🚲 , swimming 🏊 , replanting burned areas 🌱 , stargazing 🌠 , just about everything 😊
Nature Play Activities	20	find and make forts!
Nature Play Activities	20	we like hiking, finding any water we can to play in, finding cool rocks, observing insects, identifying plants, and making mud pies and potions. Hiking, swimming and wading in the river, birdwatching, observing cool rocks and creatures, gardening
Nature Play Activities	20	Run around, hike, find sticks
Nature Play Activities	20	Looking for cool rocks! Camping, hiking, reading books in hammocks, exploring streams,
Nature Play Activities	20	kayaking, climbing trees.. everything. Mostly birdwatching, hiking, cleaning up litter, rock hounding
Nature Play Activities	20	for my teens. for my students K-4th climbing trees, playing in mud, collecting litter, getting wet, building with things they find
Nature Play Activities	20	building forts and digging holes.
Nature Barriers	2	And I'm definitely guilty of not driving them out of the city for nature play. Any kind of physical interaction with the not man made outside that includes imagination. I would say my willingness
Nature Space	24	is at a 4. Anything not enclosed such as an awning I would still consider outside. But I like your thought about bringing pieces of nature inside. Yes - to me that is playing with nature. I had only thought of playing in nature when
Nature Space	24	thinking of nature play.

Nature Space	24	nature play can involve swimming in creeks or rivers, finding new bugs or plants and allowing nature to surround you!
Nature Play Activities	20	nature play can involve swimming in creeks or rivers, finding new bugs or plants and allowing nature to surround you!
Nature Space	24	5 for sure! The Sonoran Desert is full of beauty
Nature Space	24	Anything outdoors and unstructured! In my opinion, both of those would apply. For my family, the yard and neighborhood lead to more independent, unstructured play. Where a visit to mountains, lake, park are wonderful outdoor opportunities, but usually more of a structured, parent-designed activity.
Nature Space	24	Just being outside. Using whatever it is that is outside to play, imagination, building creativity and independence its tricky! A lot of the backyard games my kids get into fall in the category of "sports." Sometimes it's just throwing a stick repeatedly across the yard, other times something more structured like playing soccer. If they stop and check out a hawk in the sky or a beetle on the ground every once in a awhile (or, if not?) is it nature play?
Nature Space	24	Child-led and child-structured play with or in nature! That's my definition:)
Nature Space	24	definitely count our backyard as nature play.

Nature Play Activities	20	<p>my kids have turned old dressers, shelves, benches into magical potion stations/mud kitchens and they create and play for hours with dirt, mud, grass clippings, fallen leaves. They build big houses, try to attract birds to observe, climb a gigantic dirt mountain that my husband made and play in the pit that resulted from the creation of dirt mountain. They also bring some of those things inside, and I would count that as nature play. My daughter loves to create mandalas with items she found on hikes and will sometimes make them on her bedroom floor or at the kitchen table.</p>
Nature Space	24	<p>consider nature play as unstructured time spent outside. I would say we're a 5 Climbing tress is a fun way to explore new heights in the desert (parental supervision is required) Playing with high speeds can be a bit challenging especially in unfamiliar areas. But magnifiers, nets and flashlights are great tools to use ! As far as elements go campfires can be very knowledgeable, under the right circumstances. Rough and tumble play tend to fall in the same category as running , this can be tricky especially if you're surrounded by cacti! And of course getting lost in the Sonoran Desert as long as you're in safe boundaries can be mind changing</p>
Nature Play Benefits	6	<p>experience. My kids definitely have done the first five. Not aware of trying to disappear or get lost. That sounds scary to me. Rough and tumble play is probably what they do the most as well as play at high speed. And I have to admit I don't know what their favorite is. I would think they learn to calculate risk, find out what they like or don't, learn their strength and consequences of their actions. Gain</p>
Nature Play Benefits	6	<p>confidence and self esteem, team work,</p>

safety rules and understand their bodies better.

they climbed trees, ran along dirt trails, two kids used a saw to cut a branches, kindling was collected for campfires, they built shelters out of down branches, leaves, etc., and with two-way radios, had the opportunity to explore the woods out of sight from their parents. A large rock outcrop a quarter mile from our campsite was quickly named the “ultimate playground” and provide hours of entertainment. While we were not camping in the Sonoran Desert this past weekend, these are all activities my children have participated in in the

Nature Play Benefits

6 Sonoran Desert.

Nature Play Benefits

6 Tricky balance play

Safety is always important. So is kids learning to assess risk. What should they pay attention to? What to do if

Nature Play Benefits

6 something happens.

Safety is always important. So is kids learning to assess risk. What should they pay attention to? What to do if

Safety Tips

8 something happens.

Learning to be aware of their surroundings. I think if they understand where they are, they can enjoy it more. You understand it's dangers and build

Safety Tips

8 respect.

Safety Tips	<p>Safety is super important. I think the number one thing we can do to keep our kids safe in the Sonoran Desert is to let them experience it. During nature play, I think they observe and engage with their surroundings and learn so much about where they are and how to conduct themselves. Obviously there are precautions to take, but experience and practice are so important.</p> <p>8 Sun protection! Sunscreen, hats, sun protective clothing 🧥 Clothing appropriate to our adventure (I'm not taking \$100 keens but appropriate footwear/clothing) 📖 Knowledge of local wildlife - we talk about what critters could be active at this time of year and how to make your presence know. We also stay on the trails. 💧 Bring extra water and snacks. Always have snacks lol 🩹 First aid kit in backpack 👁️ Keep an eye on the kids (from a distance) and/or have an older child "in charge" and/or walkie talkies to allow for autonomous adventures in a</p>
Safety Tips	<p>8 familiar setting. my kids and I practice identifying desert plants and animals and learning about how to be safe around them. We also drink tonssssss of water and make sure to have plenty with us. We make decisions about appropriate clothing and footwear, though we go barefoot whenever we can, including on nature adventures if the environment allows for it. We talk about what conditions may be present and how to make good</p>
Safety Tips	<p>8 choices.</p>
Playground dislike	<p>3 I really dislike manmade playgrounds in general.</p>
Nature Play Activities	<p>20 They all should be 100% natural with logs to hop on, rocks to climb on, large rope spider webs, large loose parts 😊 Some day when I have a chunk</p>

of land I want to build a natural
playground with the help of kids

- Nature Space 24 B seems more creative
I like A because it encourages
imaginary play. Being on a boat
- Nature Space 24 surrounded by crocodiles for example.
Probably A. There is shade. That turtle
would be too hot to touch in the heat.
- Nature Space 24
Playground dislike 3 B. I really dislike playground structures.
There's a false sense of security for my
littlest ones and they seem to forget to
pay attention, and it makes me so
worried that they will fall out of one of
the openings that kind of take them by
surprise. With B, they're more actively
engaged with what they're playing on
and have to pay more attention to their
- Nature Space 24 bodies.
my kids generally to play in
playgrounds that look like Playground A
simply because those tend to be the style
- Nature Barriers 2 of playgrounds closer to our home
Though they always enjoy going to
playgrounds similar to Playground B.
Traditional playground equipment with
slides and monkey bars are fun and
seems to encourage activities such as
creating obstacle courses and races. I
see my kids engaging in more imaginary
and fantasy types of play when we go to
playgrounds that look like Playground
- Nature Play Benefits 6 B.
oh goodness they are both
wonderful....my kids and most of my
students I think would pick B because of
the rock. B offers multiple textures and
ways to interact with nature. Where as A
- Nature Space 24 looks a little more one dimensional.
Both. Lots of play and learning
happening in both environments, and I
would be so happy with them playing in
- Nature Space 24 either place.

		I think I like A because it looks cozier. :) Maybe the open space makes me a bit uncomfortable, but for my kids I don't have a preference. Whatever they like better. Building in a and b for jumping?!
Nature Space	24	
Nature Space	24	A! Probably build something? both. We live in the desert, but escape to the forest. As a result, we tend to spend more time hiking in the desert and less time stopping to play because we are on the move. We spend a lot of time camping in the forest. A weekend camping is slower and gives me kids more of a chance to stop of play rather than quickly moving through the landscape.
Nature Space	24	
Nature Space	24	South mountain park! thunderbird Conservation Park, Desert Mountain Park, Marana Heritage Park. We hiked, collected litter, examined pack rat dens, climbed trees, looked for animal tracks, climbed rocks, played hide and seek, spent time with friends, played with sticks, looked at insects.
Nature Play Activities	20	
Nature Play Activities	20	Oh and nature journaled.
Intervention Like	4	enjoyed the interactions with others, to get the different perspectives. I enjoyed the content provided on nature play. Before joining the study, I was already a proponent of nature play, and living in Arizona, the Sonoran Desert is where we play. I think I benefited most from the frequent, yet subtle nudge via your Instagram posts to take my kids out play more in nature rather than just go to our neighborhood park w standard playground equipment
Intervention Like	4	Yes! The content was a good reminder that I know what I'm doing and so do my kids. Great encouragement to keep getting out there!
Intervention Like	4	

New Nature Play Perspective	3	Yes, I know now that I should definitely give my kids the opportunity to play in the Sonoran Desert because it feels just as safe as any other place they would play outdoors. And it would give them so many new experiences!
New Nature Play Perspective	3	Because of your study, I have been thinking about safety in nature more. I realized that off all the injuries my kids and their friends that have required an ER or urgent care visit, so often resulted from playing on standardized playground equipment. Falling from monkey bars results in a lot of broken arms! While injuries can happen while playing in the Sonoran Desert, we've been lucky enough to not sustain any major injuries while spending time in nature
New Nature Play Perspective	3	Being able to learn about our surroundings and being more aware of what's in the surroundings. Was interesting to see the other posts and how to apply it to play.
Intervention Like	4	participating in this study brought the idea of Nature Play forefront in my mind, and positively influenced the activities I planned and did with my children.
Nature Play Activities	20	But magnifiers, nets and flashlights are great tools to use !
Parent Fears	3	Not aware of trying to disappear or get lost. That sounds scary to me.
Nature Play Activities	20	They climbed trees, ran along dirt trails, two kids used a saw to cut a branches, kindling was collected for campfires, they built shelters out of down branches, leaves, etc., and with two-way radios, had the opportunity to explore the woods out of sight from their parents.

Safety Important	2	They climbed trees, ran along dirt trails, two kids used a saw to cut a branches, kindling was collected for campfires, they built shelters out of down branches, leaves, etc., and with two-way radios, had the opportunity to explore the woods out of sight from their parents.
Safety Important	2	Safety is super important.

APPENDIX I
INSTITUTIONAL REVIEW BOARD DOCUMENTS



APPROVAL: EXPEDITED REVIEW

[Erin Rotheram-Fuller](#)
[Division of Educational Leadership and Innovation - Tempe](#)

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erf@asu.edu

Dear [Erin Rotheram-Fuller](#):

On 6/8/2022 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Dangerous or Safe? Changing Caregiver Perceptions and Engagement with the Sonoran Desert
Investigator:	Erin Rotheram-Fuller
IRB ID:	STUDY00016036
Category of review:	
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Recruitment instagram posts, Category: Recruitment materials/advertisements /verbal scripts/phone scripts;

The IRB approved the protocol from 6/8/2022 to 6/7/2027 inclusive. Three weeks before 6/7/2027 you are to submit a completed Continuing Review application and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 6/7/2027 approval of this protocol expires on that date. When consent is appropriate, you must use final, watermarked versions available under the "Documents" tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

REMINDER - - Effective January 12, 2022, in-person interactions with human subjects require adherence to all current policies for ASU faculty, staff, students and visitors. Up-to-date information regarding ASU's COVID-19 Management Strategy can be found [here](#). IRB approval is related to the research activity involving human subjects, all other protocols related to COVID-19 management including face coverings, health checks, facility access, etc. are governed by current ASU policy.

Sincerely,

IRB Administrator

cc: John Bello

APPENDIX J

ITEM CONSTRUCTS FOR RISK, SAFETY, AND BENEFITS OF RISKY NATURE

PLAY

Item Constructs for Risk, Safety, and Benefits of Risky Nature Play

Survey Questions	Total Possible Score
Risk Perceptions	(60)
In my neighborhood, it is normal for children to... [Climb trees.]	1-5
In my neighborhood, it is normal for children to... [Jump from heights.]	1-5
In my neighborhood, it is normal for children to... [Play on playground equipment.]	1-5
In my neighborhood, it is normal for children to... [Engage in rough-and-tumble games (e.g., wrestling, play fighting).]	1-5
In my neighborhood, it is normal for children to... [Use adult tools (e.g., hammer, saw).]	1-5
In my neighborhood, it is normal for children to... [Use loose parts (e.g., sticks, tires, timber, tarpaulins) during outdoor play.]	1-5
In my neighborhood, it is normal for children to... [Roam the neighborhood with friends but without an adult.]	1-5
In my neighborhood, it is normal for children to... [Roam the neighborhood alone.]	1-5
In my neighborhood, it is normal for children to... [Ride a bicycle or skateboard in the neighborhood with friends but without an adult.]	1-5
In my neighborhood, it is normal for children to... [Ride a bicycle or skateboard in the neighborhood alone.]	1-5
In my neighborhood, it is normal for.... [Parents are criticized for letting their child do risky play.]	1-5
In my neighborhood, it is normal for.... [Children get in trouble when they do risky play.]	1-5
Comfort with Nature	(32)
To what extent do these concerns make it difficult for you to let your child do risky play? [I am concerned that my child is going to get seriously hurt.]	1-4
To what extent do these concerns make it difficult for you to let your child do risky play? [I think my child does not know how to stay safe.]	1-4
To what extent do these concerns make it difficult for you to let your child do risky play? [I am worried that someone is going to	1-4

harm my child, either kidnapping or assault by an adult, or bullying by other children.]	
To what extent do these concerns make it difficult for you to let your child do risky play? [I am concerned that other people are going to think I am a bad parent for letting my child take risks.]	1-4
To what extent do these concerns make it difficult for you to let your child do risky play? [I have seen my child manage risky play like this before and trust s/he can handle it.]	1-4
To what extent do these concerns make it difficult for you to let your child do risky play? [I believe my child wants to do risky play and I want to give him/her my support.]	1-4
To what extent do these concerns make it difficult for you to let your child do risky play? [It is important to me that my child has opportunities to learn, build skills and try new challenges.]	1-4
To what extent do these concerns make it difficult for you to let your child do risky play? [I think risky play is a good learning opportunity for my child.]	1-4
Benefits of Risky Nature Play, Any Child	(50)
Risky play can help a child... [Learn to make decisions.]	1-5
Risky play can help a child... [Develop skills to manage risks.]	1-5
Risky play can help a child... [Develop social skills.]	1-5
Risky play can help a child... [Build resilience.]	1-5
Risky play can help a child... [Develop self-esteem.]	1-5
Risky play can help a child... [Develop self-confidence.]	1-5
Risky play can help a child... [Be more physically active.]	1-5
Risky play can help a child... [Build courage.]	1-5
Risky play can help a child... [Become more curious about the world.]	1-5
Risky play can help a child... [Become more imaginative.]	1-5
Benefits of Risky Nature Play, My Child	(50)
Now think about your child specifically to answer the following questions.	
Risky play can help my child: [Learn to make decisions.]	1-5
Now think about your child specifically to answer the following questions.	
Risky play can help my child: [Develop skills to manage risks.]	1-5
Now think about your child specifically to answer the following questions.	
Risky play can help my child: [Develop social skills.]	1-5

Now think about your child specifically to answer the following questions.	
Risky play can help my child: [Build resilience.]	1-5
Now think about your child specifically to answer the following questions.	
Risky play can help my child: [Develop self-esteem.]	1-5
Now think about your child specifically to answer the following questions.	
Risky play can help my child: [Develop self-confidence.]	1-5
Now think about your child specifically to answer the following questions.	
Risky play can help my child: [Be more physically active.]	1-5
Now think about your child specifically to answer the following questions.	
Risky play can help my child: [Build courage.]	1-5
Now think about your child specifically to answer the following questions.	
Risky play can help my child: [Become more curious about the world.]	1-5
Now think about your child specifically to answer the following questions.	
Risky play can help my child: [Become more imaginative.]	1-5
