

Benefits and risks of tree climbing on child development and resiliency

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ABSTRACT

This study examined the benefits and risks associated with tree climbing on child development and resiliency. A mixed method survey instrument was administered to parents of children aged 3-13 years who climbed trees. The survey examined demographics, details of tree climbing activities, and the type of injuries that have resulted from this type of risky play. The results indicated that even though tree climbing can result in minor injuries, it is a relatively safe outdoor activity. Children afforded the opportunity to be involved in risky play such as tree climbing grow socially, emotionally, physically, cognitively, and creatively, and have increased resiliency.

Keywords: childhood tree climbing, child development, risk-taking play, childhood resiliency

Risky play has an important role in the wellbeing, satisfaction, and development of children's current and future academic and life skills (Migliarese, 2008; Miller & Almon, 2009). Additionally, risky play develops growth mindsets and resiliency in children (Benard, 1991; Brooks & Goldstein, 2002; Little, 2010; Lieberman & Hoody, 1998). One type of risky play is tree climbing. However, many school, park, and city policies limit or even ban tree climbing activities. Research on children recreationally climbing trees in academic research journals yields little information with comparisons to professional forestry workers or loggers (National Census of Fatal Occupational Injuries, 2015), children who work on agricultural farms climbing trees for food (Mulford, Oberli, & Tovosia, 2001), and hunters using tree stands (VanWormer, Holsman, Petchenik, Dhuey, & Keifer, 2016) rather than focusing specifically on children recreationally climbing trees.

Literature Review

Risky play, such as tree climbing, is part of growing up. The literature reviewed focused on tree climbing as risk-taking play, investigating the benefits and risks of tree climbing. Additionally, the review of literature looked at policies that limit or even ban tree climbing activities. Research on child development and resiliency were also examined.

A comprehensive literature review revealed that there is limited research regarding the benefits and risks associated with tree climbing on child development and resiliency. In addition, the exhaustive investigation disclosed a void of statistics regarding tree climbing injuries.

Risks and restrictions of tree climbing. Modern man is competent in climbing trees. He climbs trees for food resources, and for protection to avoid predators and dangerous animals (Kraft, Ventkatarman, & Dominy, 2014).

Climbing begins at an early age in hunter-gatherer populations and therefore it is part of the child's play behavior (Kraft et al., 2014). Factor (2004) stated that children tend to use the space and materials that are available and "Playground equipment was almost non-existent, but children made use of trees, benches, the corners of shelter-sheds and the hard asphalt" (p. 145). According to Gathright, Yamada, and Morita (2007) "TC [Tree climbing] activities give families the chance to disengage from social pressures while providing an opportunity for healthy, enjoyable exercise" (p. 178).

While tree climbing is beneficial, risks are involved. Tree climbing injury statistics are scarce, often comparing a recreational activity to professional forestry workers or loggers (National Census of Fatal Occupational Injuries, 2015), children who work on agricultural farms climbing trees for food (Mulford et al., 2001), and hunters using tree stands (VanWormer et al., 2016). However, children climbing trees recreationally do not fall into any of these categories. A nurse practitioner reiterated the risks of tree climbing, such as scraped skin, broken bones, spinal injury, or a concussion from a fall (R. Kratzer, personal communication, February, 11, 2016). Pediatric injuries included falling from trees when picking fruit (Jain, Jain, & Dhaon, 2014).

Major organizations connecting children to nature, such as Natural Start Alliance, National Recreation and Park Association, Nature Explore, Children & Nature Network, state parks, etc. did not have specific statistics on tree climbing injuries. Safety organizations, such as National Electronic Injury Surveillance Survey, Centers for Disease Control and Prevention, National Safety Council, and National Child Safety Council, also did not have statistics. In preliminary research, local schools, parks, and hospitals were contacted to discuss tree climbing injuries. In the exhaustive search for statistics, no organization collected information specifically on tree climbing injuries in the United States that is publically available. However, in England, hospital figures show a decrease of 36% of children treated for tree climbing falls from 1999 to 2006, citing more children spending time on electronics (Evening Standard, 2007). Researchers also found that one third of children from six to fifteen years of age had never climbed a tree in England (Daily Mail, 2011).

Most would agree that climbing trees is a part of childhood. Some organizations call it a "right". Many states have passed Environmental Literacy Plans or a Children's Outdoor Bill of Rights (Lipman, 2012) with many including tree climbing as a right for all children (Lipman, 2012; Indiana Department of Natural Resources, n.d). However, there are areas that limit tree climbing, such as, but not limited to, Portland, Oregon (Portland Parks and Recreation, 2009); Elkhart County Parks, Indiana (Miscellaneous Prohibitions, 2012); San Francisco, California (San Francisco Park Code, 2014); New York City Parks (NYC Parks, n.d.), etc. A search for ("no tree climbing" policy) yields site after site of schools, summer camps, cemeteries, parks, home owner associations, etc. that do not allow tree climbing.

Other organizations take a different approach instead of a tree climbing ban. Some educate the tree climbers about rules, such as being able to get up and down the tree by oneself, only one person in the tree, no swinging in the tree, no backpacks in the tree, etc. (Play Australia, 2015). One approach to minimizing risk is through a benefit risk, recognizing there are risks, yet also showing how benefits outweigh the risk using a calculated formula to rate the risk. Potential hazards, control measures, and a risk rating with the control measures are listed. Risks noted include falling or slipping from heights, branches breaking, standing on another child's fingers, getting stuck, scrapes or lacerations from sharp points, and weak or vulnerable trees. Providers follow the control measures to alleviate the risk (Kindling Forest Schools Risk Assessment, 2010). Other organizations hang a sign on the tree as high as children are allowed to climb or designate certain trees for climbing (M. Barton, personal communication, February 8, 2016). In any of these situations, the risk is mitigated, rather than outright banned.

Organizations limit tree climbing for many reasons, such as the safety of trees or children, protected areas, and liability concerns. Modern law in the United States has interpreted liability of trees on one's property as negligence in many jurisdictions. Arborists and property owners have many questions about how the law is interpreted and applied in various settings (Mortimer & Kane, 2004). In a litigious society, more rules and regulations are being put into place to protect property owners and organizations from being sued. Sandseter and Sando (2016) concluded that safety issues, restrictions, and injury prevention limited risky-play such as tree climbing in Norwegian early childhood care settings with fear of injury cited as the top reason tree climbing restrictions were implemented.

Louv (2014) discussed this recent trend in limiting adventurous nature play, relating liability concerns and fear of legal impacts. He also suggested a review of laws across the United States in regards to recreation, private land, and children; factoring in concern about destroying nature, creating appropriate natural play spaces, and looking at laws that protect nature play. Sobel (2012) also questioned the double standard of making trees off limits when children are exposed to so many risks in their daily lives, making a comparison to showers or climbing trees. Risks are a part of life; however, society accepts those risks on a daily basis. The benefits of tree climbing make the risks worthwhile.

Risk-taking play. Play is a child's work and it is "so important for optimal child development" (Ginsburg, 2007, p. 182). "Play is essential because it contributes to the cognitive, physical, social, and emotional well-being of children and youth" (Ginsburg, 2007, p. 182). Risky-taking play has an important role in the wellbeing and satisfaction of children and in the development of their academic and life skills. Risky play involves "a situation whereby a child can recognize and evaluate a challenge and decide on a course of action (Ball, Gill, & Spiegel, 2012, p. 120).

Natural play involves taking risks and allows children to engage in creative and imaginative outdoor play. Migliarese (2008) stated that it is important to connect children to the natural world for "physical and psychological well-being, inter-and-intrapersonal skills, and cognitive functioning" (p. 6). Through natural play, children develop social, cognitive, creative, imaginative, emotional, and physical skills (Migliarese, 2008). Ginsburg (2007) also stated that natural "play allows children to use their creativity while developing their imagination, dexterity, and physical, cognitive, and emotional strength" (p. 183).

Outdoor play activities involves problem solving, critical thinking, and taking risks (Bundy et al., 2009). Learning from trial and error often happens in these outdoor play activities (Bundy et al., 2009). Tree climbing encourages adventure, creativity, and inspiration. Introducing children to spatial awareness very early in their motor development is helpful (Stevens-Smith, 2004). The various levels of height and space in tree climbing provide children opportunities for challenges and risk negotiation (Armitage, 2011). Ten potential benefits of natural play found in the literature review included:

1. Critical thinking (Bundy et al., 2009)
2. Imagination and creativity (Ginsberg, 2007)
3. Problem solving (Bundy et al., 2009)
4. Self-confidence (Benard, 1991)
5. Social interaction (Benard, 1991)
6. Dexterity and physical strength (Ginsberg, 2007)
7. Cognitive and emotional strength (Ginsberg, 2007)
8. Resiliency (Benard, 1991)
9. Risk negotiation (Bundy et al., 2009)
10. Spatial awareness (Stevens-Smith, 2004)

Child development and resiliency. Resiliency is having the strength to deal with challenges (Brooks & Goldstein, 2002). Resiliency is often defined as "good outcomes in spite of serious threats to adaptation and development" (Masten, 2001, p. 228). Wolin and Wolin (1993) listed the seven traits of resiliency: insight, independence, relationships, initiative, creativity, humor, and morality. Benard (1991, p. 12) also identified four characteristics in a resilient child: social competence, problem solving skills, autonomy, sense of purpose and future. All of these traits can potentially be derived from tree climbing.

Unstructured free play, including tree climbing, is paramount to a child's growth and development. Wells and Evans' (2003) concluded that "Natural areas proximate to housing and schools are essential features in an effort to foster the resilience of children and perhaps to promote their healthy development" (p. 327). Kellert (2005) noted that time outside enhances "critical thinking, problem solving, and creativity" (p. 15).

With little research available on the effects of tree climbing and increasing limitations on tree climbing, can benefits from natural play and resiliency be applied to tree climbing? Risky play, such as tree climbing, is often considered part of childhood. The literature reviewed focused on tree climbing as part of risk-taking play, investigating the

benefits and risks of tree climbing. Additionally, the review of literature looked at policies that limit or even ban tree climbing activities. Research on child development and resiliency were also examined. Research questions for this study were:

1. What are the risks and benefits of tree climbing, particularly in relation to the ten benefits of natural play and aspects of resiliency?
2. How do parents influence tree climbing?

Methodology

Research Design

The study asked parents in the United States with children aged 3-13 who let their children climb trees about their perspectives on potential benefits and risks of tree climbing and impact on child development and resiliency in a qualitative and quantitative 19-question online questionnaire (see Appendix B). The survey was completed anonymously and was mainly descriptive in nature. Survey questions were developed based on the literature, drawing from the list of ten benefits of natural play listed in the literature review and information on resiliency. Additionally, demographic information and perspectives on safety, injuries, and regulations on tree climbing were addressed in the survey. A mixed method approach was used after an initial pilot study was launched. The pilot group included a mixed group of fifteen respondents, reviewing the survey for face validity, wording, and purpose of the study. Pilot group participants had a variety of backgrounds from higher education, environmental education, and parents of children. Adjustments were made from the pilot study to make the questions clearer to the participants.

Selection of Participants

Participants were solicited from online groups via multiple social media outlets, parent forums, and other personal and professional online groups. Online groups included Elkhart Moms and Tots, Experiencing Nature Inside and Out, Nature Preschool Community and Ideas, South Bend Adventure Club, ROCC MOPS 2015-2016, Forest Homeschoolers, Nature Inspired Learning Group, Nature Inspired Books, Mud Puddles to Meteors, Michiana Natural Teachers, Nurturing Acorns, Connecting Children and Nature, Midwest Nature Video and Photo Pool, Early Childhood Education Outdoors, International Association of Nature Pedagogy, Our Neck of the Woods, Goshen Green Drinks, Goshen Gets Outside, Michiana Area Homeschoolers, Eat Wild, I Love Forest School, Mud Kitchens, Bicentennial Partner Nature Center, Kids in Gardens, Michiana Kids Event Calendar, Early Childhood Professionals of Northern Indiana, Loose Parts and Intelligent Playthings, and Science ECE. A convenience sampling was used as many individuals also promoted the survey in their own social media platforms, creating a snowball effect. In addition, numerous nature and childhood based social media groups and forums were contacted and the survey link was posted (see Appendix A). Applicability to all populations is limited by the groups used and convenience sampling. Permission for access was not necessary as the moderated forums were open for all. The invitation to participate was posted to online discussion forums and via email for two weeks. The bias of parent perspectives and sampling techniques limit the applicability of the study to all populations.

Instrumentation

A 19-item mixed method online survey (see Appendix B) was used to collect information. Templates were used to create a quality survey. Questions 1 and 2 were gateway items to ensure that the participant was a parent of child(ren) ages 3-13, lived in the United States, and allowed their child(ren) to climb trees. Questions 3-8 asked demographic information about the respondents' gender, education, state they live in, and the age(s) and gender of their children. Question 9 queried time spent in nature play/outside time. Question 10 inquired why parents allow their children to climb trees and Question 11 questioned if the benefits of tree climbing outweigh the risks. Question 12 looked at the benefits of climbing trees, based on the literature review. Questions 13, 14, and 15 were open-ended questions which asked about growth development, parental guidelines; rules and restrictions of tree climbing respectively. Question 16 questioned about tree climbing injuries. Questions 17 and 18 addressed the impact of

tree climbing on child resiliency, based on the literature review. The final question was an open-ended option to share any additional comments or concerns about tree climbing.

Data Analysis and Findings

Data was compiled through an online survey instrument. Analytical tools within the program were used to calculate numbers and percentages. In open ended questions, responses were coded and analyzed to evaluate emerging themes. The open ended questions allowed the respondents to reflect on their personal philosophy of risky play and how it relates to their children and tree climbing. The parental responses revealed rich descriptions and detailed information.

Demographics. Sixteen hundred and two parents completed the survey meeting the requirements of having children aged 3-13, allowed their children to climb trees, and currently reside in the United States. Of the 1,602 survey respondents, 1,489 (93%) were female and 113 (7%) were male. All fifty states were represented (including the District of Columbia); the majority of responses came from Midwest states and the West Coast.

The majority of parents that completed the survey were college educated. Seventeen percent had some college, 38% graduated from college, 27% completed graduate school, and 6% completed post graduate school. Based on the 1,602 responses submitted, 65% of the children spend 10+ hours per week outside. The survey responses were fairly evenly distributed between the study age ranges of 3-13. The backgrounds and parenting styles of the respondents impacted the findings.

Finding 1: Benefits and Impact of Tree Climbing. When asked why parents allow their children to climb trees in Question 10, parents shared many reasons (see Figure 1). Parents could check all that applied, resulting in multiple responses for each reason. Clearly, tree climbing is fun and part of childhood. Parents want their children to experience some of these same joys they had as children. Additionally, children develop skills, connect to nature, and negotiate risk as part of tree climbing.

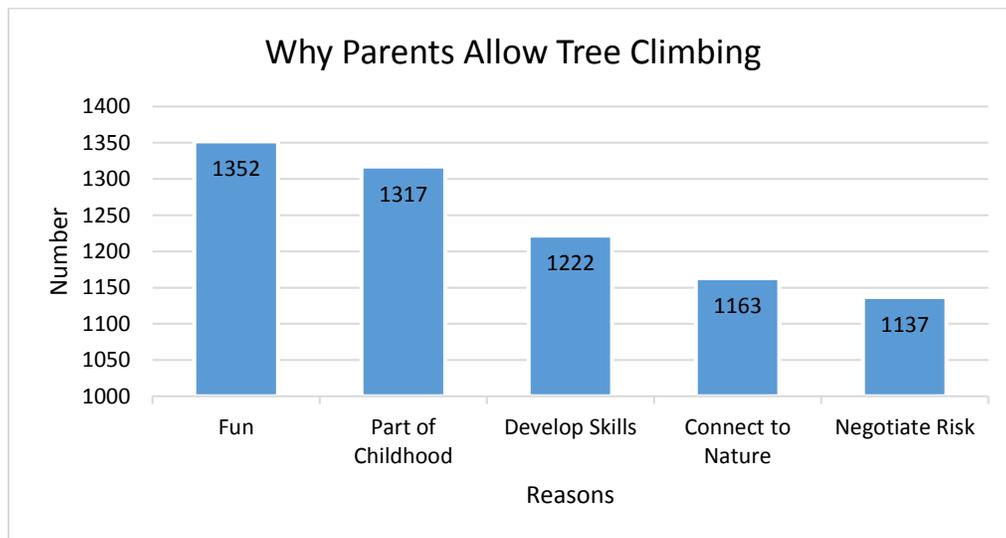


Figure 1. Why Parents Allow Tree Climbing. This figure illustrates why parents allow their children to climb trees.

Parents shared other reasons why they allow tree climbing (see Figure 2) with larger words indicating the word was used more frequently in the responses, created in the software used to analyze the results. There is a strong sense of tradition, with over thirty respondents sharing some variation of tree climbing being a part of their own childhood or as a societal tradition. One responded, “It was my absolute favorite thing to do as a child. It makes me feel close

to my children when they find joy in the same activity I did.” Several parents shared that they still love climbing trees as parents.

Exercise Body Awareness Problem Solving Fruit
 Strength Energy Limits Childhood Loved
 Peace Climb Self Trees Play
 Confidence Activity Develop Stop
 Learn Daughter Nature Fear Sense Sensory Enjoy

Figure 2. Reasons Parents Allow Children to Climb Trees. This figure is a text analysis of respondents' reasons for allowing children to climb trees.

Additionally, parents reported their children enjoy climbing trees. Fifty-three wrote in some form of how their children enjoy the activity. Some children “are drawn to do so” while other parents mentioned, “I’m not sure how I would stop them.” “It’s their passion.” One noted, “Because she loves to climb and I don’t want to deny her the joy I had as a child.”

Nineteen people reported, “Why not?” One remarked, “It’s what kids do if there is a tree. It’s not a matter of allow or not allow.” Similarly, twelve mentioned that trees are there and meant to be climbed, realizing it would be denying their childhood to not allow this activity.

Thirty-three commented on physical benefits of tree climbing, typing in exercise, balance, strength, proprioception skills, etc. as some of the physical benefits. It helps with hand-eye coordination and body awareness, gets out energy, and develops dexterity. One respondent wrote, it “teaches him to trust and believe in his whole body’s abilities.” Others commented on sensory input and play.

Parents also allow tree climbing for emotional benefits, such as building confidence, helping each other, perseverance, freedom, sharing, peace, meditative, empowering, social activity, self-awareness, etc. One parent wrote, “Watching my daughters work to master something they originally thought they could not do. Empowering!” Others “need to climb to be happy and calm.” Another said, “He seems at peace in a tree.” The alone time and a place to get away is also valuable. Character building was mentioned, in the form of learning to plan/strategize, understanding own limits, problem solving, independence, a sense of achievement and accomplishment, perspective, understanding cause and effect, risk taking, personal boundaries, conquering fear, decision making, self-determination, imaginative play, goal setting, etc. One parent said, “My child is cautious, so if my child feels confident he can do something, I encourage it.”

Perspective taking was also mentioned as a reason to allow climbing. “They enjoy sitting up high”, “get a different view of the world”, and can “see from a different angle.” Tree climbing gives “varying views on the world” and a “better view of the neighborhood.” “They enjoy having a ‘secret’ bird’s eye view of the world around them.”

Some use tree climbing for geocaching or for adventure. A few others mentioned tree climbing to get fruit. It is also a way to enjoy nature and “explore wildlife in our tree canopy”.

Question 11 asked whether the benefits of tree climbing outweigh the risk, sharing injuries that could happen as a result of tree climbing. Over 1,400 responded to the question with 82% agreeing or strongly agreeing that the benefits of tree climbing outweigh the risks (see Figure 3).

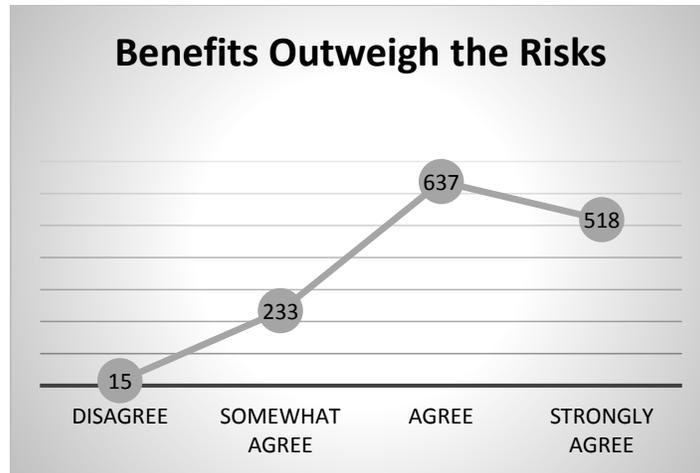


Figure 3. Benefits Outweigh the Risks. This figure indicates that the benefits of tree climbing outweigh the risks.

Question 12 asked how tree climbing impacts their children, listing ten benefits that can potentially be developed through tree climbing. Response options ranged from no impact to high impact (see Figure 4). Parents reported tree climbing highly impacts self-confidence, dexterity and physical strength, risk negotiation, spatial awareness, and problem solving at rates over 60%. Social interaction was the only characteristic that parents rated over 10% as no or low impact, with a total of 30% rating social interaction as no or low impact.

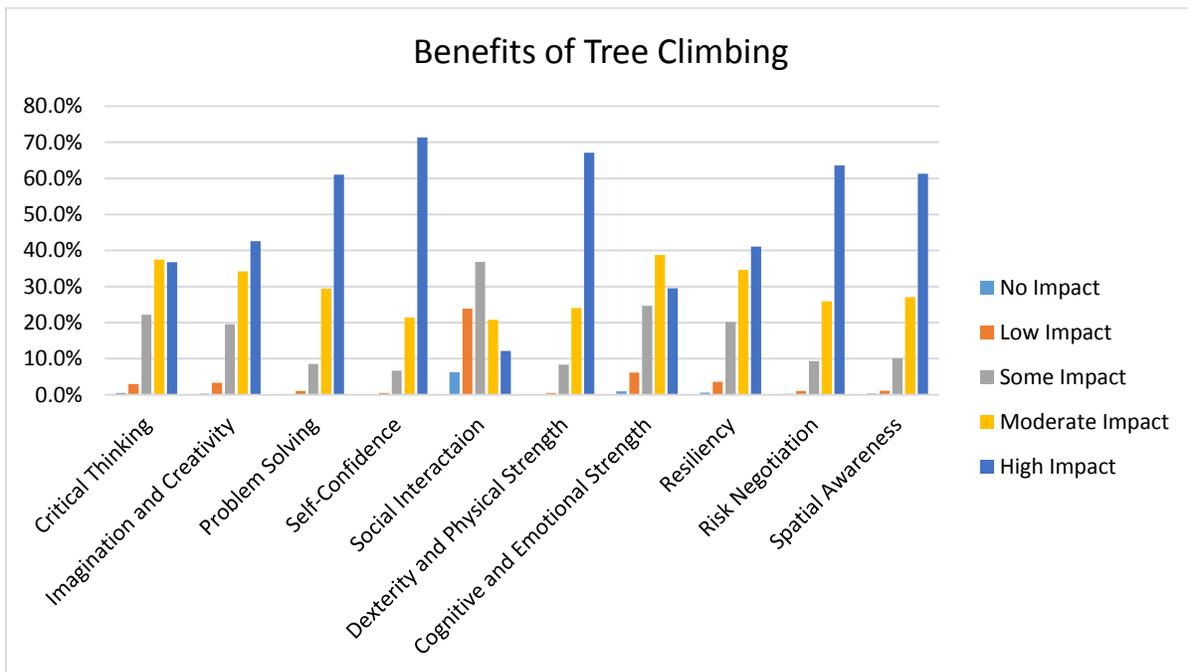


Figure 4. Benefits of Tree Climbing. This chart illustrates the perceived impact of tree climbing on ten attributes.

Parents were asked how tree climbing helps their children grow in Question 13. Many parents talked of independence, physical benefits, the importance of risky play, and benefits of tree climbing mentioned in Question 12. The word cloud (see Figure 5) shows the more frequently used words as larger, such as building confidence, problem solving, learn, explore, taking risk, having freedom, spatial awareness, etc.



Figure 5. The Ways Tree Climbing Helps Children Grow. Parents commented by using the words in the word cloud.

Question 13 asked how tree climbing helps their children grow. One parent responded,

It requires problem solving, assessment of risk, resolution of the fear enough to attempt to climb, perseverance after failure, sense of mastery and bravery after a fall and injury (that required urgent care), connection with nature and the awe we should all have about the world around us. Provides a coping resource to use for my child when he needs to calm down or when he needs certain sensory or body input.

Another had similar observations:

Develops confidence and problem-solving skills (how do I get over there?). Expands their awareness of what's possible (I can do this, I can get this high like a bird, feeling of openness and accomplishment like climbing a mountain . . . pure joy). My boys also do a lot of playacting in trees (e.g. imitate birds).

Even when a child was injured, one parent related the child's response and her own hope that he continues tree climbing, sharing how her son has a special tree that becomes a "a space capsule, bus, tree house, and special friend secret meeting place." Her six-year-old fell six feet from the tree, breaking his nose. She said, "His response is that he's learned about his limits and survived to tell the tale. He was so brave through his recovery and surgery. And I truly hope he will return to the tree soon." Many parents of tree climbers recognize and accept the risk of tree climbing, knowing the risks and potential injuries are growing experiences for their children. One parent put it, "They are trying something new and challenging. If they succeed it helps them develop confidence. Even some cuts and scrapes are seen more as 'badges of honor' rather than traumatic."

Finding 2: Rules and Restrictions. The study investigated how families use their own rules and restrictions to limit potential risk in tree climbing. This was an open-ended question that parents were not required to answer; however, many parents had something to say, with 1,242 total responses for Question 14. Responses could be coded for more than one restriction (see Figure 6).

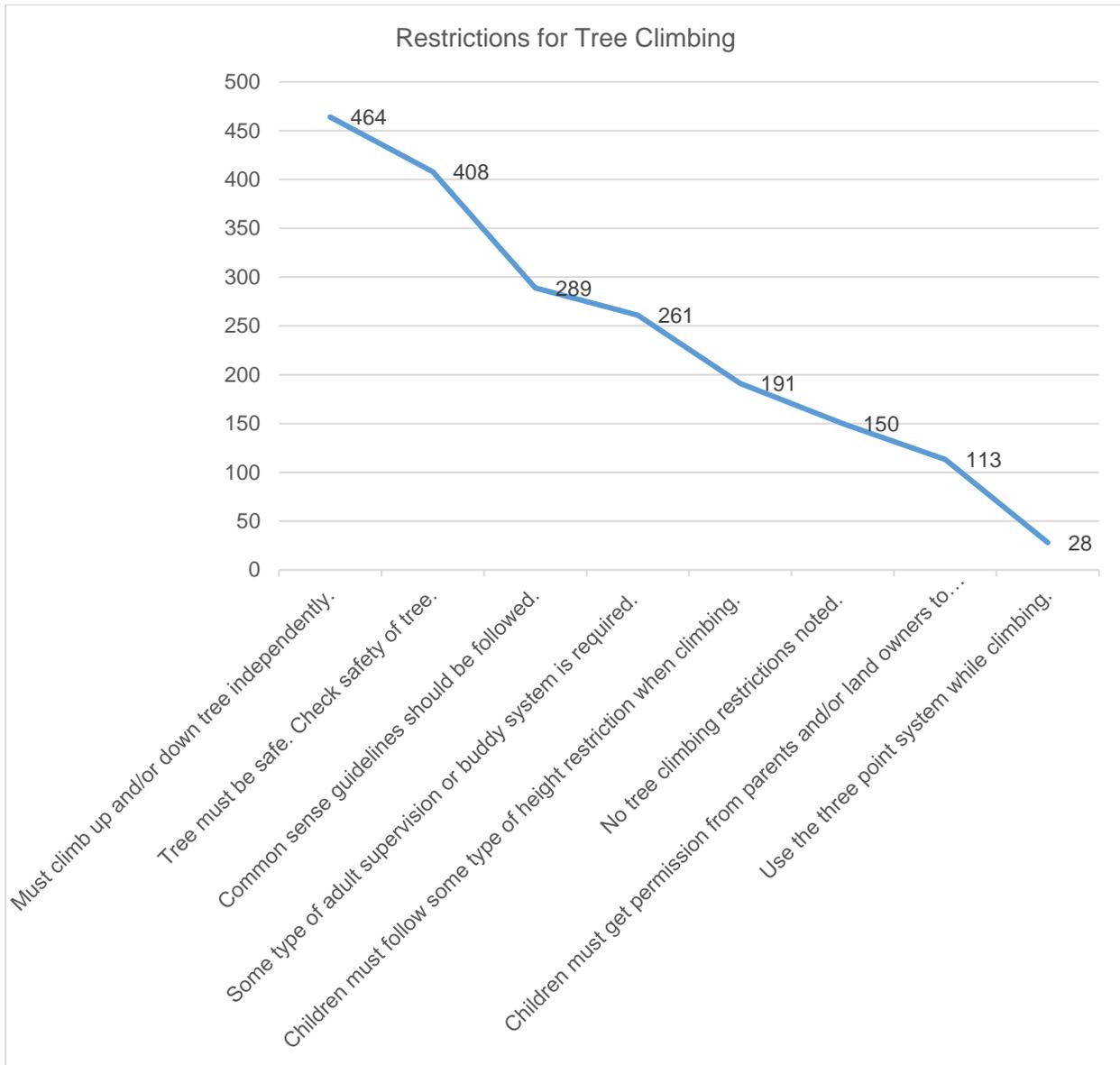


Figure 6. Restrictions for Tree Climbing. This figure describes parental tree climbing restrictions.

The most common restriction for children tree climbers was to climb up and/or down the tree independently. One parent said, "If you need me to put you up, it is beyond your skill and you shouldn't be there." Some parents strategize with the child or give advice; however, others rely on the child to figure it out. One parent noted the restriction "helps keep them within their physical abilities but also gives them confidence to test their own limits."

Parents also looked to the physical safety of the tree so both child and tree have less risk of being harmed. Some guidelines included:

- Look for weak branches
- Test tree strength
- Avoid dead branches
- Be respectful of tree
- No climbing if wet or slippery

- Test tree branch on each step
- Check for hanging branches

Many parents had common sense guidelines, such as “be safe”, “be careful”, “use good judgment”, “pay attention”, “be aware”, etc. Some parents require supervision or a buddy system while climbing. These restrictions vary from needing an adult right there to having a sibling nearby so he/she can call for help. When parents are nearby they may also talk a child through the climb to help identify risks. Younger children typically need more adult supervision while older ones often have fewer restrictions.

Some parents have height limitations for children climbing trees. Some were very specific, such as no taller than the two story house, not over eight feet or ten to fifteen feet, “not higher than my head”, etc. Other general restrictions included “don’t go higher than you feel comfortable” or “no higher than you can jump”. Some clarified “too high” as the top third of the tree where the tree is less developed with smaller branches. Since trees vary, the more general restrictions seemed more popular as a safe height in a mature tree might be much higher than a safe height in a newer tree.

Many parents noted no restrictions for their children when climbing trees. These parents trust the children to know their own body and limitations, after having shown their skills. One parent found their children are “very good at self-regulating.” Other children are cautious by nature and limit their own climbing. While many do not have restrictions per se, some parents may be nearby and others may offer advice or encouragement. Several parents mentioned their older children may have no restrictions, while the younger children have more supervision and guidance while tree climbing. One parent remarked, “They know what their bodies are capable of and have never really done anything I considered unsafe.” Another said, “Have fun, get messy, make mistakes.”

In some families, the children must get permission from their parents or the land owners to climb a tree. Additionally, parents may have restrictions based on attitudes of bystanders. The children need to follow the school or other public property rules for climbing, seeking permission at neighbor’s houses and other private areas. Some general guidelines may be followed, such as, “We don’t climb inside of gardens, we don’t climb small trees and we don’t climb when bystanders are upset or angry by the idea.” Another parent had similar thoughts, “No climbing neighbor’s tree. You will probably scare them.” “Don’t stress out less risk tolerant adults,” limits some children. One parent remarked, “I have a hard time when we are around others, people tend to freak out. Our rule is to not climb in public places when other people are around.” Other parents limit tree climbing permission when younger children are nearby in public, as the example may cause children to want to climb. Some parents do not allow neighbor kids to climb, as they “don’t want that responsibility.”

Many parents reported some type of general rule to use the three-point contact system, meaning at least three appendages (feet and hands) should be attached at all times to the tree, similar to rock climbing rules. One parent explained it, “Three [human] limbs on the tree at all times – two arms and one leg, or two legs and one arm. You cannot fall if you follow these rules!”

Question 15 asked how rules and restrictions impact tree climbing activities. The open-ended question was interpreted in a few ways; some shared how their own rules affect their child(ren)’s tree climbing and others responded how tree climbing has been limited in their local area. A few themes emerged in the responses: parental fears; safety of the child; local restrictions on tree climbing building skills such as self-regulation, independence, and risk negation; and caring for trees and the environment. Two hundred four of the 1,037 responses reported no impact of restrictions on tree climbing.

Some parents (twenty-one of 1,037) commented on their own fears that impact their children’s tree climbing experiences. One parent noted, “I feel like my fear could limit them, but I try my hardest to squash it, since I see how much they love it.” Another parent recognized, “I know I need to start learning to trust them but I still feel some anxiety when they climb.” Many parents tried to curb their own fears to allow their children to experience the benefits of tree climbing, with one parent mentioned, “By not allowing her to climb trees/explore/seek

adventure for that reason [mom's internal anxieties] would be in MY best interest. Not hers." One mother noted, "I try to limit what I say and just watch and be there if needed." Many parents recognized their children would like to climb higher than the parent's comfort.

Parents also put rules and restrictions in place to allow for safety of the child. Three hundred twenty-five of the respondents mentioned some type of safety concern, expressing the need to learn to follow rules. One parent mentioned, "I just want my children to consider safety as they explore and learn about themselves and nature." Another parent remarked, "Our culture's hyper focus on safety is having a damaging effect on our children's ability to self-regulate. We are basically saying that we don't trust them and if we don't trust them, how will they learn to trust themselves?" Some safety precautions included wearing appropriate clothing and shoes, testing out the safety of the tree, using common sense, adult inspection of the tree, not climbing too high, giving the child boundaries, minimizing risks, tree selection, setting limits, being able to get into the tree by him/her self, adult supervision, etc. Analogies for safety were made to looking across the street before crossing and playing sports, saying, "Tree climbing is a sport really and without rules and guidelines it becomes unsafe."

In today's world, many recognize that children cannot save the earth without first knowing the earth. Parents noted this as well. Sobel (1998) said, "If we want children to flourish, to become truly empowered, then let us allow them to love the Earth before we ask them to save it" (para. 46). Tree climbing is one way to allow children to experience that connection with nature first hand. A parent mentioned, "They respect the tree itself." Another noted, "They are responsible for the environment and themselves." Eighty-three of the responses mentioned considering the health or care of the tree in their open-ended write in responses.

Parents reported limitations on tree climbing in local areas. At times, there is lack of access to climbable trees, such as no "tree to climb at my kids' public elementary school", bans on tree climbing (at an arboretum, Home Owner Association controlled neighborhood or city property), no access to appropriately sized trees (too small or large), having lower branches of trees trimmed, etc. A mother expressed concern about signs limiting tree climbing in a natural play area. "Finding climbable trees is the biggest challenge!" A parent in New Jersey noted her children are not "allowed to touch the trees in their school playground." There is also confusion as to knowing "when it's ok and not ok to climb." At one school, tree climbing is banned due to danger and insurance prohibition. A "feet on the ground" policy at a local park is causing a family to seek more rural areas with fewer climbing restrictions. A line painted on the tree shows how high a child can go. Others mentioned a rule that the child climbs only twice as high as his/her height.

Other parents limit tree climbing as well. This was also noted in Question 14 responses. Parents observed tree climbing limited for special events, "social norms", seeking owner's permission before climbing, etc. A parent mentioned, "I do see some mothers get very nervous or they restrict their child and I see how that affects the child's confidence and belief in himself. He cries, gets nervous too or loses interest." The negative responses of nearby adults also can restrict climbing. A "teacher flipped out because he climbed a tree." Parents noted other adults being annoyed if the child was climbing. Some families felt "embarrassment. Less inclined parents tend to watch and stare." A parent observed caution, "They only climb trees at home so no one will call police or child services." Children also felt "upset greatly", "mad", "disappointed", "frustrated", etc. when tree climbing was limited. One parent said "cops get called" if children climb at the local park. One family only climbed trees while camping or at home as there are "too many judgmental people out there telling us how dangerous it is." More families limited visits to areas that do not allow tree climbing due to fear of confrontation and restricted play. One said, "The moment you come to a wonderful park and see a giant list of DO NOTS We choose to enjoy those places for that day and visit places more frequently that allow more opportunity to navigate freely."

Parents had concerns on the limitations noting, "Not letting them climb is the worst you can do"; "More restrictions=Less benefit to child"; and "My children don't want to go places that restrict their play." The restrictions kept the children "from learning their limits"; "impedes their creativity, dexterity and risk management"; and negatively impacts children being adventurous, intuitive, and creative. Thankfully, many neighborhoods did not see restrictions on tree climbing. A mother in South Carolina typed, "We have yet to encounter a space where tree climbing is discouraged."

Finding 3: Injuries from Tree Climbing. Injuries can occur when climbing trees; however, injuries occurring from this outdoor childhood activity are minimal. Of the 1,123 participants that responded to the survey question, 94.84% (1,065) reported that their child scraped a knee, elbow, or skin as a result of climbing a tree, 1.16% (13) suffered a fracture, 1.78% (20) endured a broken bone, and 0.71% (8) experienced a dental injury. More serious injuries such as a concussion and coma were also reported with 1.60% (18) experiencing a concussion and 0.45% (5) a coma. Unfortunately, 0.53% (6) reported a fatality; however, other responses by these same participants did not indicate a death, but a positive acceptance of tree climbing. Various other injuries such as stitches, bee stings, splinters, bug bites, bruises, abrasions, twisted/sprained ankles, and tongue biting, were reported by 10.33% (116) (see Figure 7). The data indicated that even though tree climbing can result in minor injuries, it is a relatively safe activity for children.

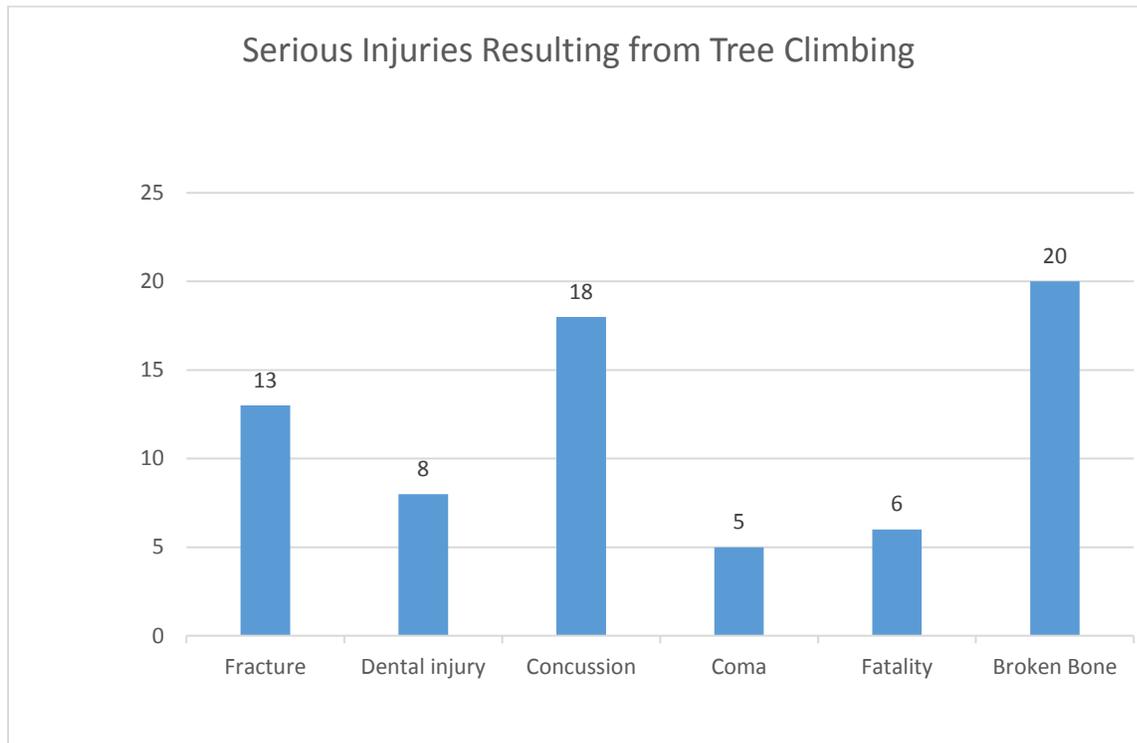


Figure 7. Injuries Resulting from Tree Climbing. This figure depicts serious injuries that result from tree climbing.

Finding 4: Tree Climbing and Resiliency. Tree climbing affects resiliency in many ways, such as solving problems and decision making (see Figure 8). Questions 17-19 in the survey looked at resiliency. Tree climbing provides children with the ability to adapt in uncertain situations. The data from the survey indicated that 84.2% (1,145) of the respondents feel that tree climbing has some impact, moderate impact, or high impact on a child's ability to adapt (see Figure 8). In Question 19, the following comments potentially substantiate the findings. Parents reported the children are "more adaptable" and "able to roll with sudden change". Children face issues like "a branch that's not sturdy enough to stand on, and find a different way up." Children have the opportunity to "carry on" when faced with difficult tree climbing situations. "Tree climbing presents them with these options at every branch."

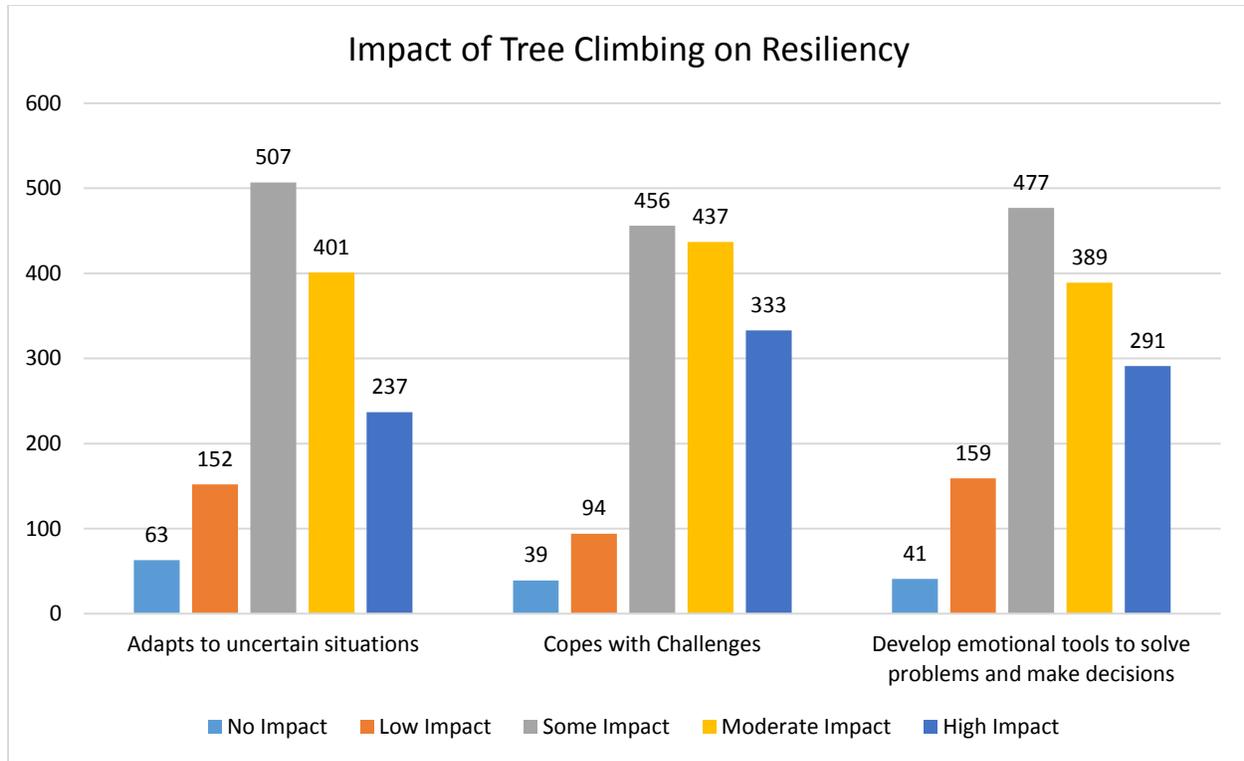


Figure 8. Impact of Tree Climbing on Resiliency. This figure demonstrates the effect of tree climbing on resiliency.

Tree climbing also potentially provides children an opportunity to cope with challenges. Tree climbing had some impact, moderate impact, or high impact on facing and conquering new challenges, as evidenced by 90.2% (1,226) of responses. Qualitative parent comments included:

- “Anytime kids have to solve their own challenges and problems they develop resiliency.”
- “I believe he is learning to finish what he starts and overcome challenges, because once you’re up, you have to figure out how to get down. There are no shortcuts!”
- “Yes, when faced with a challenging problem, they must think outside the box. Maybe calm down and rethink the situation. Ask for help if needed.”
- “Willing to take safe risks. Don’t give up when something is hard, challenging.”
- “Tree climbing challenges them and puts them in all different situations where they learn to look forward to the solution and know that they must work until they find it!”

Tree climbing theoretically provides children with opportunities to develop emotional tools to solve problems and to make decisions. Of the parents responding to the survey, 85.3% (1,157) indicated that tree climbing had some, moderate, or high impact on critical thinking, perseverance, persistence, confidence, and decision making. Parents responded that tree climbing develops “increased ability to think critically” and children were “more determined and also learned not to give up.” Tree climbing created “a feeling of accomplishment and confidence in having conquered something.” Others mentioned:

- “Try, try again is routinely heard!”
- “He has learned to fail and try again and to overcome fears.”
- “My child grows exponentially in terms of confidence and positive self-confidence every time he climbs a tree and successfully navigates the descent unassisted.”

Parents mentioned benefits such as thinking “ahead of their actions to the consequences. They know to assess their surrounding for risk and attempt to solve a problem (being stuck on a high branch) before asking for help.” Confidence grew “when they climb higher or negotiate a tricky tree. That confidence boosts resiliency.” Another mentioned, “They have more self confidence in their ability to take risks because they stretch themselves.” They developed “confidence in themselves, courage and ability to adapt and decide.” One parent said, “Persistence. Every time he tries he wants to try to go higher.” Lastly, “They don’t give up!”

Discussion and Recommendations

Risky play has an important role in the wellbeing and satisfaction of children and in the potential development of their academic and life skills. Parents of tree climbers recognize and accept the risk of tree climbing, knowing the risks and potential injuries are growing experiences for their children. Even though tree climbing can result in minor injuries, it is a relatively safe activity for children. Therefore, the benefits of tree climbing can make the risks worthwhile.

“Risk-taking can, and does, result in positive outcomes” (Little, 2010). Based on the 1,602 parents that completed the survey, the data concluded that tree climbing affords children with the ability to adapt in uncertain situations, provides an opportunity to cope with challenges, and gives children the opportunity to develop emotional tools to solve problems and make decisions. Parents also allow tree climbing for emotional benefits, such as building confidence, helping each other, perseverance, freedom, sharing, peace, meditative, empowering, social activity, and self-awareness.

Recommendations for Future Studies

This study assessed the benefits and risks of tree climbing on child development and resiliency across the United States. A follow-up study where the focus is placed on one area of the country (region, state, city, or school district) would help provide further guidance and direction.

Although this study reached sixteen hundred and two parents, the majority of survey respondents were female (93%). A male’s perspective on the benefits, behaviors, rules, restrictions, injuries, etc. could vary and provide additional insights into the study. Additionally, seeing if perspectives vary by ethnicity could be helpful. Children of respondents to this study spend a lot of time outside. Looking at a larger mix of the general populous might provide additional insight and perspectives to children recreationally climbing trees.

As many tree climbing bans cite liability as a reason for the ban, looking at related court cases would be helpful. Understanding expectations of insurance companies might alleviate public concerns to allow tree climbing on their properties. Using similar questions to understand lawyer, judge, public space provider, environmental educator, and insurance perspectives on the topic might be fruitful. What are reasonable policies that allow tree climbing while still attending to insurance and tree protection needs?

Investigating fears of parents would give another perspective on children climbing trees. Many parents mention not climbing trees in public places because of the judgment of others at the park. What are socially acceptable ways to allow tree climbing and risky play for children? How do these fears impact tree climbing and risky play?

Further examining the risks involved with tree climbing is warranted. Although the majority of reported injuries were minor (scraped knees, broken bones, dental injuries); further investigation is needed to confirm the low incident of injuries during tree climbing. In addition, to the minor injuries reported, 0.53% (6) fatalities were reported although those parental comments did not confirm the fatalities, further follow-up and analysis on the details of these tragic events would be beneficial.

Conclusion

This study examined the benefits and risks of tree climbing on child development and resiliency. Parents of children aged 3-13 that climb trees participated in a mixed method survey instrument. The results of the survey assessed four main findings: benefits and impact of tree climbing, rules and restrictions, injuries from tree climbing and tree climbing and resiliency.

According to the parents participating in the study, children afforded the opportunity to be involved in risky play such as tree climbing have the potential to grow socially, emotionally, physically, cognitively, and creatively, and have increased resiliency. Bans on tree climbing and other risky play pose problems such as limiting access to natural spaces, creating fear of participation in adventurous activities, and fewer opportunities to negotiate risk and develop resiliency.

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APPENDIX A

Pilot Link and Communication -----

Hi-

A few colleagues and I are working on a research project on the benefits and risks of tree climbing. We are doing a pilot of our survey to see if we are missing anything, to make sure it works, and to seek feedback if there are other avenues we should explore.

Would you mind taking the survey for us by Thursday, May 19th? We'd also appreciate it if you have comments about the survey itself to send them to me.

This is a test version of *The Benefits and Risks of Tree Climbing on Child Development and Resiliency*, a survey my colleagues and I designed using SurveyMonkey.

Here is a link to the Survey Pilot: <https://www.surveymonkey.com/r/treeclimbingpilot>

Thanks so much!

Survey Link and Communication -----

Greetings!

Do you live in the United States and have children aged 3-13 that climb trees? If so, we need your assistance with a research study we are working on!

One type of risky play that children are exposed to is tree climbing. The purpose of our study and survey is to determine the injuries associated with tree climbing to examine the benefits and risks associated with tree climbing on child development and resiliency.

Please click on the following link and complete the survey: <https://www.surveymonkey.com/r/trrclimbing>

The survey should take you 5-10 minutes. Also, if you have any fellow friends, family, neighbors or colleagues that also live in the US and have children aged 3-13, please forward this information on. We would appreciate it! If you have any questions or concerns, please feel free to contact us.

Thanks in advance for your assistance!

Survey Results -----

<https://www.surveymonkey.com/results/SM-92M5L7TR/>

APPENDIX B

Survey Questions

1. Do you have a child or children aged 3-13? Yes No
2. Do you allow your child(ren) to climb trees? Yes No
3. Do you live in the United States? Yes No
4. What is your gender? Female Male
5. In what state do you live? (Drop down menu of all 50 states)
6. What is your age?
 - 18 to 24
 - 25 to 34
 - 35 to 44
 - 45 to 54
 - 55 or older
7. What is the highest level of education you have completed?
 - Did not attend school
 - Some high school
 - Graduated from high school/GED
 - Some college
 - Graduated from college
 - Some graduate school
 - Completed graduate school
 - Completed post graduate school
8. How old are your children? Check all that apply.
 - 3 years old
 - 4 years old
 - 5 years old
 - 6 years old
 - 7 years old
 - 8 years old
 - 9 years old
 - 10 years old
 - 11 years old
 - 12 years old
 - 13 years old
9. Reflecting over the past month, on average how often has your child(ren) played outside each week? If you have more than one child, use an average of how much time they spent outside over the last month.
 - 0-3 hours per week
 - 4-6 hours per week
 - 7-9 hours per week

10+ hours per week

10. Why do you allow your child(ren) to climb trees? Check all that apply.

Part of childhood
Fun
Connect to nature
Develop skills
Negotiate risk

11. Injuries such as broken bones, a concussion, scrapes, and other serious injuries up to including a fatality can result in an accident while tree climbing. Do the benefits of tree climbing outweigh the associated risks?

Disagree
Somewhat Agree
Agree
Strongly Agree

12. Tree climbing impacts my child in these areas? Rate high to low impact.

Critical thinking
Imagination and creativity
Problem solving
Self-confidence
Social interaction
Dexterity and physical strength
Cognitive and emotional strength
Resiliency
Risk negotiation
Spatial awareness

13. Does climbing trees help your child grow? How? Please explain.

14. What rules or guidelines do you have as a parent for your children climbing trees? Please explain.

15. How do rules and restrictions impact tree climbing activities with your children? Please explain.

16. Has your child(ren) suffered from any of the following injuries as a result of climbing trees? Please check all that apply.

Scraped knee, elbow, or skin
Fracture
Broken bone
Dental injury
Concussion
Coma

Fatality
Other (please specify)

17. Has tree climbing impacted your child's resiliency?
Adapts to uncertain challenges
Copes with challenges
Develops emotional tools to solve problems and make decisions
18. Has tree climbing helped your child develop resiliency? If so, how? Please explain.
19. Would you like to share any other comments about children climbing trees?

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