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Nature-based Early Childhood Educators' Perspectives on Embracing Fire as a Loose Part

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ABSTRACT

With the rise of nature-based early childhood education (NBECE) and emphasis on the importance of risky play, it is prudent to investigate a different approach to fire safety, through experimenting with fire and following necessary safety precautions within NBECE and other settings. This study explored fire as a loose part, safety considerations, and best practices for using fire in early childhood settings. An online survey instrument was disseminated via nature organizations and social media platforms examining demographic information, use of fire as a loose part and fire play approaches within early education settings with 290 qualifying respondents. The study used a convenience sampling technique to investigate practices and concerns focused on fire play through educators' perspectives of children aged two years through eight years. Results indicate that programs using open flame as part of fire play are using additional fire safety protocol and precautions and respondents cite safety as a primary reason for allowing fire play. Fire play, when it is allowed, can be done safely, thoughtfully, and carefully.

***Keywords*:** nature-based early childhood education, loose parts, risky play, fire, fire safety

With the rise of nature-based early childhood education (NBECE) and emphasis on the importance of risky play, it is prudent to investigate a different approach to fire safety, through experimenting with fire and following necessary safety precautions to use fire within NBECE and other settings. The purpose of this study is to explore fire as a loose part and safety considerations of fire play in early childhood settings. The study used a convenience sampling mixed method research approach to gather results and data representative of the NBECE target population. As a result of this research study, recommendations and best practices for incorporating fire as a loose part in a safe way in early childhood settings were formulated.

Literature Review

Fire making or fire play as part of early childhood settings is not well researched and often feared and avoided. In an informal search of more current risky play academic research articles, fire was mentioned, but only as an example of dangerous elements and not expanded on beyond that. However, fire can be viewed as an aspect of both risky play and a loose part. The literature review explored embracing fire as a loose part and current nature-based early childhood educators' fire safety practices.

Embracing Fire as a Loose Part

It is important to establish a working definition of loose parts as it relates to early childhood education. “Loose parts are often associated with play, but they are also vital components to learning and growth” (Gull et al., 2021, p. 5). In 1971, architect Simon Nicholson coined the term “loose parts” in his article entitled *How NOT to Cheat Children - The Theory of Loose Parts.* He wrote:

> There is evidence that all children love to interact with variables, such as materials and shapes; smells and other physical phenomena, such as electricity, magnetism and gravity; media such as gases and fluids; sounds, music, and motion; chemical interactions, cooking and fire; and other people, and animals, plants, words, concepts and ideas. With all these things all children love to play, experiment, discover and invent and have fun (Nicholson, 1971, p. 30).

In addition, Nicholson (1971) stated "In any environment, both the degree of inventiveness and creativity, and the possibility of discovery, are directly proportional to the number and kind of variables in it” (Nicholson, 1971, p. 30).

Gull et al. (2019) performed a scoping review, highlighting 15 articles in their quest to develop a working definition of loose parts. In the article, the authors wrote their loose parts definition to include:

> Loose parts are open-ended, interactive, natural and manufactured materials that can be manipulated with limitless possibilities. Interaction with loose parts includes experimentation, exploration, and playful interactions with variables through creativity and imagination. Participants have the freedom to explore variables, combine materials, and react to complex themes and ideas that emerge. Facilitators encourage participants, make loose parts available, stimulate discovery, provide opportunities, allow for open-ended play, and prompt meaningful connections and experiences. Through loose parts exploration participants develop imagination, creativity, and collaborative skills. Process is more important than the end product fostering overall growth and development (Gull et al., 2019, p. 51).

The researchers at Johns Hopkins All Children’s Hospital shared,

> Fire is a tool and a fascinating one. It's a basic element, like earth, air, and water. Fire is energy. In fact, it's a chemical reaction happening right in front of your eyes. It needs fuel and oxygen to burn, but once it starts burning, it doesn't stop until it runs out of one or both of them. That's what makes it both valuable and dangerous. (Johns Hopkins All Children’s Hospital, n.d. para.7).

Gull suggested fire as a loose part might include: “dramatic play, candles, charcoal mark making and art, mini fires, magnifying glass fires, a fire pit, and cooking over a fire” (2023, July 27). Natural materials found in the environment can often be used during dramatic play. According to Flannigan and Dietze (2017), “It seems that when loose parts are available to children, they not only perceive the functional use of the environment or materials, but also view such items as sticks, leaves, and trees as having imaginary qualities that children can incorporate into play episodes” (p. 56). They extended this to illustrate how children used logs as a pretend fire, adding more fuel, and pretending to warm themselves by the fire.

Current Nature-based Early Childhood Educators’ Fire Safety Practices

Nature-based early childhood education (NBECE) has been growing in popularity as educators find ways and spaces to take learning and play outdoors in a variety of formats, such as using outdoor classrooms, attending farm, zoo, or aquarium schools, implementing a forest school or kinderforest approach, or spending the afternoon outside daily in a public kindergarten classroom. Of note, nature preschools have been growing exponentially in the last several years. From a recent Natural Start Alliance (a professional development group for NBECE through the North American Association for Environmental Education) survey, nature-based preschools have grown 200% from 2017,

with over 800 programs registered on their site and around 25,000 children enrolled in nature preschools yearly in the United States (Natural Start Alliance, 2023). According to Larimore (n.d.), in NBECE "programs nature is at the core of the curriculum, there is extensive daily outdoor time over the course of a school year, and teachers implement high-quality early childhood practices as well as high quality environmental education practices" (para. 1).

Some nature-based early childhood programs have taken a different approach to fire safety, embracing fire as part of their programming. Tammy Lockwood, a family childcare provider in Lansing, Michigan, uses fire with her Umbrella House program with infants through school age children. She shares the procedures and rules for having a fire, including having a burn permit, calling the fire department before a fire is lit, having a latched fence outside the fire pit, appropriate safety precautions (water, fire blanket, fire gloves), supervision, cooking from outside the fence, and extinguishing the fire (Gull, 2023, July 27).

Similarly, programs create their own regulations and/or benefit risk assessment specific to the type of risky play, the setting, and the situation. Benefit risk assessments help identify and mitigate issues that might arise in a risky play situation. In Claire Warden's book (2012), *Fascination with Fire: Charcoal*, several benefits of interacting with fire are outlined, with connections to science, expressive arts, technology, numeracy, literacy, health, and well-being, and social. Additionally, hazards are listed, along with the level of risk, precautions to take, and revised risk levels. For example, with the hazard of fire spreading, it is a medium risk. Suggested precautions include having buckets of water and sand nearby, a fire blanket handy, a nearby fire extinguisher, appropriate cooling of ashes with water or sand, designated areas for building fire with high visibility, and keeping a small and controlled fire with awareness of how high winds might affect the fire. With these precautions, the revised risk level is low. Likewise for other hazards, precautions can be taken to make the fire building interaction as safe as possible while also building risk negotiation skills in children.

The following outline of developmentally appropriate fire related activities might be explored with support for individual needs and accommodations for full inclusion. When children have not experienced these activities early on, they may start them at any age and move on from there.

- Age 2: putting out a candle with a candle snuffer, feeling the heat of a fire, pretend fire making with sticks/logs, scarf flames, and a rock fire safety circle, dramatic play cooking over pretend campfire
- Age 3: sitting around a campfire, potentially cooking over the fire, using crayons on fire heated rocks, mark making with cooled charcoal
- Age 4: striking a match, lighting a candle, preparing wood for charcoal making, making a spark with flint and steel, using charcoal for art, expanding cooking options
- Ages 5+: making small, personal fires, creating charcoal ink
- Ages 8+: making an ember bowl, creating the group fire
- Ages 10+: creating their own fire making kit, exploring additional traditional fire making options, experimenting with fire add ons, such as orange peels and sugar, trail cooking, using lightweight camp stoves. (Gull, 2023, July 27)

Fire safety in many of these situations include having a bucket of water, bucket of sand, fire gloves, fire blanket metal tongs, metal pot for refuse, clean up cloths, and hand cleaning materials.
Additionally, Gull shared,

> Fire is a living loose part and has been part of our history as a species, often selecting for those who could survive (hunting, gathering, fire, etc.) . . . By "playing around" with the elements of fire, children understand the power and capacity of this basic element. It takes experimentation and

> exploration to light and keep a fire going. We learn to be appropriate around fire by being around fire, not by eliminating it from our lives. (2023, July 27)

Research Questions

While minimal guidelines for fire safety and experimentation are available, fire making is often not embraced as risky play or as a loose parts approach in early childhood education settings. As such, the researchers attempted to understand this topic more fully through the following research questions:

- How is fire considered a loose part in early childhood settings?
- What safety and other considerations do early childhood settings use with fire play?
- What best practices can be gleaned from other early childhood educators using fire in their settings?

Methodology

Research Design

An online mixed method survey instrument was disseminated via social media platforms examining background and demographic information, use of fire as a loose part, implementation, and safety guidelines. To ensure reliability and validity and reduce bias, the survey was sent to educators throughout the United States in all types of early education settings and programs. A pilot study was conducted, receiving responses from 10 early childhood practitioners to check reliability and validity, understand how the questions worked, the length of time to complete the survey, and if any adjustments needed to be made.

The study used a convenience sampling research method to gather results and data representative of the NBECE target population. Deming (1950) defines convenience sampling as "the science and art of controlling and measuring the reliability of useful statistical information through the theory of probability" (p. 2). "Convenience Sampling is a non-probability sampling technique commonly used in both quantitative and qualitative research" (Golzar et al., n.d., p. 75). Based on the projected sample size of the NBECE and related professional development organizations that granted permission to post, the study aimed for a minimum sample size of 271 total study participants. The sample size was determined based on survey sampling sizes from Ernst et al. (2012) and the calculation of a 90% confidence level out of 181,779 possible population (Raosoft, Inc., 2004).

Selection of Participants

Participants for the study were recruited from diverse NBECE and related professional development groups that focus on nature-based early childhood education. NBECE settings might include having an outdoor classroom, being a nature-based preschool or elementary school, using a kinderforest or forest school approach in their setting, childcare with an outdoor focus, regular programming in an outdoor context, or being a family childcare provider with an emphasis on spending time outside.

An announcement and invitation to participate in the study were shared with many related professional development groups that spanned the targeted age ranges. Participants anonymously answered the research survey where they had an opportunity to reflect on policies and viewpoints on fire as a loose part and current fire safety practices in their settings. The following organizations agreed to share or allowed the researchers to share the survey with their memberships and/or contacts with NBECE settings: Natural Start Alliance, The Grove by Samara Early Learning, Loose Parts Play, Loose Parts Learning in K-3 Classrooms, Natural Start Regional Groups, Nature Inspired Teacher, Eastern Region Association of Forest and Nature Schools, Tinkergarten, American Forest Kindergarten Association, and Nature Explore/Exchange Press. To qualify for the study, participants needed to work in the United States in an early childhood setting with two to eight-year-old children, be at least 21 years of age, and spend time

outside with the children in their care. Participants had an opportunity to reflect on policies and viewpoints on fire play in early childhood settings.

Instrumentation

After receiving Institutional Review Board approval of research, the survey link was shared with the selected professional development groups. In addition, a snowball recruitment technique was utilized. The online invitation included parameters of the study, a request to share with other NBECE early childhood educators, and a link to the online survey. The flyer was distributed to the professional development groups that gave permission in 2024.

After the qualifying questions for the study, the survey gathered demographic information and asked if the participants allowed fire in their settings. In Question 16 of the survey, the researchers asked,

> For the purposes of this study, we are defining fire play as an aspect of loose parts with more of an extension of curiosity and exploration around fire whereas fire setting would be an intentional attempt to cause harm with fire. Fire play might include charcoal, dramatic play, candles, lighting a match, crafting a small fire, bonfire as community program, burning a leaf with a magnifying glass, etc. Do you allow children in your professional care or facility to experience fire play with safety parameters?

Using skip logic, similar questions were asked to those who do not and those who do allow fire play in their settings. Information was collected on fire play activities, safety parameters, impacts of fire play, fire safety rules, personal or professional concerns or issues on the topic, and considering the use of fire as a loose part and risky play. Additionally, respondents could share any open-ended comments or thoughts. Those who answered yes were also asked about fire safety with an open flame or injuries that may have happened connected to fire in their programs.

Data Collection

Data, results, and findings of participant responses, opinions, and experiences were collected using an online survey instrument. A mixed method research approach was used to gather quantitative data and qualitative responses, with no personally identifiable results collected. SurveyMonkey was the cloud-based survey tool utilized to compile and securely store information. The descriptive analysis tools within SurveyMonkey were used to guide reports of demographic information, percentages, and charts based on the quantitative data collected. Although not required, the open-ended questions allowed participants to share additional information, perspectives, and experiences associated with embracing fire as a loose part. The open-ended responses were sorted, coded, and analyzed using a narrative analysis method to evaluate findings. As a group, the researchers looked at these responses, color coded each comment for themes represented and used the analytical tools within the program to see frequency distribution of responses.

Demographics

Of the 413 total responses to the survey, two-hundred ninety qualified for the study and completed the survey. Participants worked with children ages 2-8, were at least 21 years old, work in the United States, and spend some time outside in nature with the children in their care to qualify for the study. Fifty-four were disqualified for not meeting parameters of the study or agreeing to the terms of the study. Additionally, 69 were removed from the study as they did not complete all required questions.

Of the survey respondents, 267 (92.1%) were female, 15 (5.2%) were male, 5 (1.7%) were nonbinary and three (1.0%) chose not to disclose gender. Participants from 42 states were represented, and a wide variety of ages responded to the survey, ranging from ages 21 to up to 74. Two hundred eighty-seven (99.0%) of the respondents had completed at least some college. Diverse perspectives of educators and educational settings were essential to the study. Questions 11 and 12 asked participants their role and type of settings they worked (see Table 1).

Table 1. *Type of Early Educational Setting*

Educational Setting	Number (Percentage)
	n=290 total respondents
Nature-based preschool	134 (46.2%)
Non-profit	97 (33.5%)
Private	93 (32.1%)
Other	61 (21.0%)
Forest school	57 (19.7%)
For-profit	49 (16.9%)
Family childcare	44 (15.2%)
After school programs	33 (11.4%)
Public	33 (11.4%)
Non-Formal education programs	32 (11.0%)
Experiential-based school	30 (10.3%)
Note: Respondents could choose more than one setting.	

Additionally, responses from experiential, faith-based, forest kindergarten, Head Start and state funded preschool, elementary schools, farm school, and other settings were represented in smaller quantities. Some respondents wrote in the "other" category, settings such as Reggio Emilia inspired, university lab school, nature center, short-term programming, tribal immersion, adventure playground, community group, afterschool programs, camps, outdoor schools, etc.

Participants had various roles in the early childhood settings as noted in Table 2.

Table 2. *Role of Educators Responding to Questionnaire*

Role of Educator	Number (Percentage)
	n=290 total respondents
Teacher	179 (61.7%)
Program director	88 (30.3%)
Early childhood administrator	59 (20.3%)
Teacher educator	52 (17.9%)
Family childcare provider	41 (14.1%)
Professional development instructor	36 (12.4%)
Other	35 (12.1%)
Trainer/Consultant	29 (10.0%)
Note: Respondents could choose more than one role.	

Smaller numbers of non-formal educators, assistant teachers, after school care, camp counselors, higher education professors, faculty researcher, and mental health counselors were represented. Other respondents entered roles such as owner, librarian, director, occupational therapist, mentor, outdoor curriculum coach, advocate, forest school supervisor, etc.

In addition to their role and educational setting, Question 13 asked participants how old the children are in their care with the ability to choose multiple ages between two to eight years old. Respondents worked with the following age groups:

- 142 (49.0%) 2-year-olds
- 232 (80%) 3-year-olds
- 246 (84.8%) 4-year-olds
- 237 (81.7%) 5-year-olds
- 123 (42.4%) 6-year-olds
- 92 (31.7%) 7-year-olds
- 88 (30.3%) 8-year-olds

In Question 14, participants were asked how often children in their care played outside each week, weather permitting. Participants were able to select blocks of hours ranging from 0-3 to 20+ hours per week. There was a mix of all selections with 10-15 hours being the highest choice with over 25% spending time outside.

Question 15 asked participants to describe the outdoor setting used for play and learning. Respondents could select all applicable areas and results are included in descending order below:

- Outdoor Classrooms 180 (62.1%)
- Playground 149 (51.4%)
- Unfenced Open Space 130 (44.8%)
- School Garden 119 (41.0%)
- Access to Park or Public Spaces 104 (35.9%)
- Use of the "Beyond" 84 (29.0%)
- Backyard 65 (22.4%)
- Other 57 (19.7%)
- Large Asphalt Space 36 (12.4%)
- Adventure Playground 31 (10.7%)
- Courtyard 29 (10.0%)
- Landscaping Beyond the Fence 28 (9.7%)
- Parking Lot 28 (9.7%)

Other settings included a wide variety of outdoor settings, such as wooded areas with a stream, Nature Explore outdoor classroom certification, walking trails, parks, asphalt playground, nature center, tribal lands, beach, college campus, scout camps, national park, undeveloped land, farm, etc.

In Question 16, respondents were asked if they allow fire play (including the definition for the study) in their setting using skip logic for the following sets of questions. One hundred fifty-three (52.8%) allowed fire play in their settings while 137 (47.2%) did not allow fire play. Questions 17-27 were specific to respondents who said "no" to Question 16. Questions 28-43 were for those who responded "yes" to Question 16, reported in the findings below.

Findings

Research Question: How is fire considered a loose part in early childhood settings?

Perspectives regarding fire play as a loose part came up in many responses. In Question 31, educators who allow fire play to read a quote pertaining to loose parts by Nicholson and were asked how fire is applied as a loose part in their

setting. One-hundred seventeen of the 153 (76.5%) respondents indicated that cooking was used in their educational setting, while 110 of the 153 (71.9%) embraced the use of charcoal. The same number, 110 of the 153 (71.9%) also used dramatic play props. Ninety-three out of the 153 (60.8%) of the responses revealed that they encouraged exploration of fire as a loose part, while 74 out of 153 (48.4%) supported experimentation with fire as a loose part. Additionally, one respondent wrote in additional comments, "I see fire as an important element to get to know along with air (running, feeling the wind in your face, interacting with and noticing the effects of the wind), and water with which children have several places to play." Other responses mentioned the warmth of the fire, using elements to make pretend fires, children driving the exploration, and using fire as part of ceremonies.

Respondents who allow fire play shared perspectives on fire as a loose part. In Question 42, 78 of the 102 respondents (76.5%) shared comments relating to fire as a loose part. Fourteen respondents (13.7%) wrote responses indicating fire is not a loose part. Also, 14 respondents (13.7%) made remarks that considering fire as a loose part was a new concept or idea.

Additionally in Question 42, those who did not see fire as a loose part (13.7%) mentioned that there was more oversight and less freedom for the child to explore the element of fire freely in their settings. They see fire more as a tool, resource, or skill. One mentioned, I "do not allow students to 'free play' with fire." Some mentioned the other materials (charcoal, sticks, wood, kindling, etc.) that make up fire may be loose parts, but not the actual fire. One respondent wrote, "I don't think I would. Loose parts are elements that kids are free to experiment with and use as they see fit. Kids don't have that kind of agency with fire in our program." "Children are allowed to chop kindling, play with kindling sticks, construct fire structures, and play with charcoal. They are never allowed to regard fire as something to play with." Another said, "In our program, loose parts are much less risky than tools."

Several responses (13.7%) in Question 42 mentioned fire as a loose part as a new idea. One mentioned, "I never thought about fire as a loose part before. However, it is like snow, rain or ice. We use those elements as loose parts whenever we have them available." Some also "realized I actually do a lot with fire before an actual fire." Respondents were curious and encouraged about fire as a loose part and noticed ways the children in their care used fire (or the elements to make a fire) as a loose part.

Many responses to Question 42 saw fire as a loose part yet also indicated the need to have safety parameters and build risk negotiation skills. Representative quotes on fire as a loose part are in Table 3.

Table 3. *Qualitative Comments Embracing Fire as a Loose Part from Educators who Allow Fire Play*

"Fire is as open ended as the simple stick. The stick is at once a sword, a building material, and a paddle for magic potions; so too the fire is the means of culinary metamorphosis, a destructive engine, and a center of community so powerful it often goes without saying."
"Fire can allow for explorations and experimentation. Being able to burn sticks and cook foods, make charcoal, burn leaves are all ways to pique interest and curiosity for children."
"Tool for wonder, connection, and risk assessment skills."
"Fire is useful for warmth, community, cooking, gathering, focusing, relaxing."
"We use fire for ritual purposes. Lighting Shabbat candles or Hanukkah candles. . . . Fire shows up a great deal in children's dramatic play. It is a wild element fascinating for young children and mesmerizing for all."
"Fire is interactive with other materials. It is a phenomenon on it's [sic] own. It changes other parts it is combined with. Fire as a loose part allows for the construction and deconstruction of things as other loos [sic] parts do. It is beautiful. and can de [sic] dangerous. Like knives, scissors, etc. With care it can provide a great deal of exploration, confidence, and problem solving as well as great respect for its properties."
"Fire is as dynamic as any other feature of our adventure playground, in the sense that it's not prescriptive and is full of possibility."

"It's flexible, can be used for many means, creative, productive, and powerful."
"It changes and changes other objects that interact with it."
"I see it as a critical pillar of the loose parts philosophy!"
"Fire is an unpredictable, beautiful, fascinating tool that children are naturally attracted to. It creates Instant Respect and excitement and curiosity."
"Fire acts as another loose part offered by nature in that it presents opportunities for students to interact with it based on interest, curiosity, creativity and imagination. Just like with our use of sticks, logs, rocks, cones, leaves, etc. (all nature's loose parts), the hazards of fire necessitate that we collaborate with students to define safety agreements around our engagement with it."
"Fire as a loose part might be like a wooden block that a kid drives a nail in with a stick. It's a combination of loose parts that in ways is more dangerous/risky/hazardous than the individual loose parts used to make it . . . It is a dangerous loose part in the way a roaring creek is dangerous in that immersing oneself in it is hazardous but using another object like a stick can help you approach it and play with it (safely). Broken into components, the flames can be calming and magical to watch. The charcoal is seemingly unlimited like a good loose part but also can be applied to specific types of play."
"Fire, like nature is the perfect elixir that is both stimulating and calming in the perfect ratio. Fire, like other loose parts, is something that a child or adult can just be present with and contemplate. Just as fire dances, it ignites something beautiful in the child!"

Respondents were asked about a variety of related activities they may allow their children to participate in as part of Questions 17 and 31. Participants who said they do not allow fire play, do permit dramatic play and pretend fire play with loose parts with no actual flame as part of their programming. Respondents who allow fire play permit children to engage in a wider range of fire play activities, some of which actually include a lit flame. See Table 4 for fire play activities and engagement for both "no" and "yes" study participants, grouped by having less than 20% difference between the responses.

Table 4. *Fire Play Activity Engagement Similarities*

Fire Play Activities	Do not allow fire play	Allow fire play	Percent difference
	n=137 total respondents	n=153 total respondents	
Pretending to put out a fire	55 (40.1%)	78 (51.0%)	10.9%
Pretending to blow out birthday candles	103 (75.2%)	102 (66.7%)	8.5%
Pretend cooking over a pretend fire, such as use of an unlit hibachi grill, pretend gas stove in mud kitchen, etc.	99 (72.3%)	117 (76.5%)	4.2%
Dramatic play with props, such as rocks, sticks, logs, scarves, etc.	117 (85.4%)	135 (88.2%)	2.8%
Note: Respondents could choose more than one response.			

Pretend or dramatic play are predominant in both groups, highlighted by playing "at" fire rather than having direct experiences with fire.

In Table 5, responses from Questions 17 and 31 were examined between the "no" and "yes" groups that have more than 20% differences in spread between both groups.

Table 5. *Differences in Fire Play Activities*

Fire Play Activities	Do not allow fire play	Allow fire play	Spread between columns
	n=137 total respondents	n=153 total respondents	
Adult cooking over a fire for the group	6 (4.4%)	82 (53.6%)	49.2%
Creating a fire safety circle	15 (11.0%)	92 (60.1%)	49.1%
Sitting around a campfire	40 (29.2%)	118 (77.1%)	47.9%
Putting out a fire	6 (4.4%)	79 (51.6%)	47.2%
Bonfire as part of a community program	13 (9.5%)	86 (56.2%)	46.7%
Using charcoal for mark making	40 (29.2%)	105 (68.6%)	39.4%
Making a spark with flint and steel	1 (0.7%)	55 (36.0%)	35.3%
Individual cooking over a fire	1 (0.7%)	50 (32.7%)	32%
Lighting a match or lighter	2 (1.5%)	43 (28.1%)	26.6%
Burning a leaf or other object with a magnifying glass	6 (4.4%)	46 (30.0%)	25.6%
Crafting a small fire-tin can, pie plate, or other	4 (2.9%)	43 (28.1%)	25.2%
Exploring traditional fire making options	2 (1.5%)	39 (25.5%)	24%
Using logs and sticks to create a fire without lighting it	87 (63.5%)	132 (86.3%)	22.8%
Use charcoal for artwork	54 (39.4%)	93 (60.8%)	21.4%
Note: Respondents could choose more than one response.			

The children in settings that allow fire play have a much broader set of experiences and opportunities to interact with fire and fire safety. They also have more complex and diverse strategies for fire.

Twenty percent or above of participants who allow fire play also responded: lit a candle, created charcoal ink, used candles as part of a community or memorial service, or dipped/rolled a wax candle. At smaller percentages, some also used candles/ash/incense/etc. as part of religious observations, used crayons over heated rocks, experimented with fire add ons (orange peels or sugar), cooked on the trail, made an ember bow, created a fire making kit, put out a candle with a snuffer, used a lightweight camp stove, or participated in smudging. However, the spread between those who allowed/did not allow fire play was less than 20 percent with many of the activities not happening at all or in very low numbers with those who did not allow fire play. Other responses for those who said “no” to allowing fire play included items that often-reflected responses above such as collecting sticks, using a birthday candle, and engaging with community fire safety providers. One respondent stated, “We still use Smokey Bear. Only you can stop forest fires.” One used sterno cans for making s’mores with children indoors. Another mentioned, “children dance around the sacred fires in the Plankhouse.”

Participants who allow fire play entered additional options for fire play, such as collecting materials for fire making, boiling water for tea and/or using a Kelly Kettle, storytelling around the campfire, experimenting with snow and fire, and using the fire pit as a gathering spot. Several responses included a cultural or ritual aspect such as burning paper messages, walking around the fire for a birthday, singing special songs, birthday candles, and "experiencing the warmth of a fire in a sugar shack and log cabin." Another participant shared, "We chalk the seasons on the firepit blocks and the kids sing the earth goes round the sun for birthday kids as they walk around the fire circle with a small flame."

Research Question: What safety and other considerations do early childhood settings use with fire play?

Safety was specifically asked about as part of the survey and came up frequently during the open-ended responses. Respondents were asked about traditional fire safety activities, additional fire safety opportunities, fire-related injuries, and rules to promote safety.

Questions 18 and 29 asked respondents about engagement in traditional safety fire activities (see Table 6).

Table 6. *Engagement in Traditional Fire Safety Activities*

Type of Safety Practice	Do Not Allow Fire Play	Allow Fire Play
	n=137 total respondents	n=153 total respondents
Practicing Stop, Drop and Roll	78 (56.9%)	71 (46.4%)
Watching an age-appropriate video, book, or other materials on fire safety	62 (45.3%)	43 (28.1%)
Using coloring books about safety	33 (24.1%)	21 (13.7%)
Practicing fire drills	129 (94.1%)	111 (72.6%)
Locating smoke detectors	78 (56.9%)	48 (31.4%)
Finding exit signs	91 (66.4%)	55 (36.0%)
Locating classroom meeting spot	89 (65.0%)	102 (66.7%)
Visiting with a firefighter in full protective clothing	83 (60.6%)	58 (37.9%)
Hosting a guest speaker around fire safety from community experts and agencies	49 (35.8%)	30 (19.6%)
Visiting the fire station	39 (28.5%)	19 (12.4%)
Exploring a fire truck	81 (59.1%)	46 (30.1%)
Practicing calling 911 in event of an emergency	38 (27.7%)	28 (18.3%)
None	4 (2.9%)	13 (8.5%)
Other (please specify)	3 (2.2%)	26 (17.0%)
Note: Respondents could choose more than one response.		

A few who do not allow fire play mentioned that the yearly fire inspections were part of their activities as well. Other responses from those who do allow fire play emphasized the importance of fire safety, utilizing fire inspections and fire drills to emphasize fire safety, wildfire risks, and fire procedures with one mentioning, "Whenever we encounter a fire circle in the "beyond", which is about once a week, we pretend it has a fire and practice fire safety. We don't

walk within the boundary, we don't put things into or take things out (unless you are the grown up), etc." Others use songs that include fire safety and a social story about the school's fire safety approach.

In Questions 19 and 30, respondents were asked about specific fire safety activities (see Table 7).

Table 7. *Fire Safety Activities*

Fire Safety Activities	Do Not Allow Fire Play	Allow Fire Play
	n=137 total respondents	n=153 total respondents
None	101 (73.7%)	23 (15.0%)
Practicing safety behaviors within a fire circle	13 (9.5%)	104 (68.0%)
Gradual approach to learn about practical fire safety as exposed to fire	11 (8.0%)	100 (65.4%)
Practicing how to put out a fire	9 (6.6%)	80 (52.3%)
Fire play with safety parameters	7 (5.1%)	73 (47.7%)
Creating a benefit risk analysis around fire play within your program	6 (4.3%)	67 (43.8%)
Other (please specify)	4 (2.9%)	11 (7.2%)
Note: Respondents could choose more than one response.		

In Question 36, respondents who allow fire play shared the injuries or hazards that have happened as part of fire play in their setting (see Table 8).

Table 8. *Injuries or Hazards as a Result of Fire Play*

Injury or Hazard	Number (percentage)
	n=153 total respondents
None of the above	94 (61.4%)
Eye irritation due to smoke in eyes	32 (21.9%)
Minor burn	22 (14.4%)
Cuts, splinters, scrapes	22 (14.4%)
Smoke inhalation	12 (7.8%)
Breathing problems	5 (3.3%)
Other (please specify)	4 (2.6%)
Blisters	3 (2.0%)
Injury from cooking sticks, metal, tools or fire equipment	3 (2.0%)
Clothing or hair catches fire	2 (1.3%)
Fire spread outside of designated fire area	2 (1.3%)
Eye injury due to floating embers	1 (0.7%)

Major burn	1 (0.7%)
Fatality	1 (0.7%)
Chronic respiratory issues	0 (0.0%)
Start of a wildfire	0 (0.0%)
Note: Respondents could choose more than one response.	

As noted in Table 8, most programs (61.4%) allowing fire did not report any injuries or hazards. Minor issues were noted in smaller quantities. While several recorded eye irritations, one "other" response said, "Eye irritation was momentary and fleeting." One mentioned scraped knuckles from using flint and steel and another responded some children ate food that was too warm. While one respondent noted a fatality, when looking at the open-ended responses for that individual throughout the survey, the responses were non-sensical, such as "sada", "gfds", "wqd", "gs<", "sd", with no written indicators of a fatality.

In Question 23, those who do not allow fire play could write in responses around issues or concerns regarding fire play. Environmental concerns showed up in the written responses as not having enough/adequate space in their environment for this type of activity, the location is not conducive to exploring fire, not a good curricular fit based on location, concern around spreading of fire, and fires being hazardous in high wildfire areas. One respondent wrote, "Living in an [sic] tightly urban center with fires that have fatalities, it seems very inappropriate and insensitive to families who have suffered through such tragedies."

Developmentally appropriate practices (DAP) also emerged as a theme in some written responses, as educators shared lack of knowledge of DAP and fire play, appropriateness of fire when working with 2-year-olds, concerns when working with children with developmental delays or special needs, lack of self-control at some ages, meeting the needs of mixed aged groups, and wondering whether fire play fits within DAP. One asked, "Why would an average, regular facility/program put any child at risk of being burned?!"

Over 70% of the open-ended responses to Question 23 involved safety, with most writing in "safety" and many remarking on the need for supervision (see Table 9).

Table 9. *Qualitative Safety Comments from Educators who Do Not Allow Fire Play*

"In a public school setting, I feel it begins with safety and liability concerns. But, even if allowed, we'd have issues with space, class size, instructor comfort, and manageability."
"Licensing is not comfortable with the idea. Not having a safe set up for a fire is a worry. All the what ifs"
"Fire prevention, fire safety education is allowed and encouraged Lighting fires, using fire for play is not allowed. Injury prevention is paramount when caring for other people's children. A fire pit, fire place, fire circle would require one staff member to assigned to supervise the fire at all times. Classrooms working at the state's teacher: child ratios are not staffed well enough to provide high quality education and care for all of the children in the group, so do not have enough staff to tend a fire as well."
"Fire, while an actual requirement for life on this planet; the sun comes to mind!, is not for 'play'. It can mutilate and destroy and kill. Teachers can be distracted, and accidents happen. Why would an average, regular facility/program put any child at risk of being burned?! If a child is older, and in the right program, like scouts, then sure. In a care program for children the ages one usually see in childcare/preschool, absolutely not!"
"The risk of injury is too high. Smoke is very dangerous for young children's lungs and eyes and a small burn can be very dangerous. Fire and children are both unpredictable and a risky combination."
"That a real fire is not appropriate with 20 children to watch over"
"We have issues and concerns around playing with fire, as opposed to doing Montessori work, such as science experiments, with fire. We do not allow any fire activities for children unsupervised by an adult"

Additionally, some who do not allow fire play shared concerns over parent reactions, worrying about what parents will think, families not on board, that fire interaction should be a home-based activity, and lack of supervision at home. One shared, "I believe many staff and parents would be concerned that kids would try to start fires at home. Personally, I think that if taught appropriately, it is valuable for students to understand how fire helps us too." Another responded, "We teach fire safety. Some families choose to extend fire exploration say during camping. It's a family choice."

In Question 39, environmental concerns showed up in the written responses around issues and concerns around fire play. Concerns showed up around environmental conditions, such as smoke and neighbor complaints or worries, damaging nearby fields and buildings, high risk fire areas, appropriate places for fire building, weather related concerns, changing winds, and the environmental impact of burning wood. Another shared, "witnessing a fire in a park condones fires in parks by anyone." One wanted to collaborate with the host site more to have designated areas for interaction with fire while others recognized the additional time and effort to prepare and clean up from fire related activities.

Additionally in Question 39, DAP was addressed in these open-ended responses, as some shared concerns using fire with mixed aged groups, noting younger children not as body aware, and recognizing ability is not always tied to age. One wrote, "Getting a read on children and not assuming kids of the same age will all behave the same. Adapting activities to the kid and not a specific age." Some may allow fire in mixed age groups if the younger children are not attending that day. One responded, "We have a range of ages (3-9) that commune around our fires and use "fire as loose parts." Rules and restrictions vary with es h [sic] age group, so making sure each child is handling fire safely and using fire play in developmentally appropriate ways is the main issue within our learning environment." Additionally, "The biggest issues I have faced are having enough adults to monitor both the fire and the children and ensuing children have enough executive function skills to be safe around an active fire."

Respondents to Question 39 also mentioned teacher concerns and staff training. In addition to comments around the need for teacher training and conflicting viewpoints on whether to include fire play, others shared perspectives around training, competency, confidence (see Table 10).

Table 10. *Qualitative Teacher Education Comments from Educators who Allow Fire Play*

"Fire is a valued feature of our playground so we work hard to keep it safe and do a lot of adult education around it."
"The preschool teachers are not comfortable facilitating fire play. The very limited fire play we do with the young children is facilitated by preserve teachers in a methods class and the university professor."
"So far we have only explored the use of Fire with teachers who have been adequately trained and have years of experience. We hesitate to allow newer teachers or those who have not shown extreme responsibility to practice the new skills."
"Teachers have been trained forest school fire safety."
"Teacher training and teacher confidence in fire safety with children. Many of my teachers would rather avoid fire altogether, but we have seen it be an essential piece of our forest school."
"The biggest risk or concern is in educators who are uneducated and/or unskilled/unpracticed at engaging in collaborative benefit/risk assessment with students."
"Our staff are trained on how to safely start a fire with kids. If our staff are uncomfortable with fire play, they do not have to engage in it with their students."
"The teachers have to be well-trained in building, supervising, and extinguishing fires."
"Training for staff- only 4 of our current classrooms can do fires due to staff training and staff interest."

Many responded there were no issues, with one commenting, “There are no issues!! The children love it!! Their maturity presents at a higher level when they are around fire. They love the responsibility and trust!”

More than half of the written responses to Question 39 involved safety, typically sharing concerns and the need for safety measures (see Table 11).

Table 11. *Qualitative Safety Comments from Educators who Allow Fire Play*

“We have developed strong protocols by conducting staff-wide risk/benefit analysis sessions centered on fire. We don't have issues or concerns.”
“With plenty of conversations with families around safety as well as the need for children to experiment with fire we reduce the issues. families mostly are worried about safety and starting a fire in the community.”
“Fire is a valued feature of our playground so we work hard to keep it safe and do a lot of adult education around it.”
“Mainly, we just 'practice' our fire rules several times before we ever actually build a fire. A grown-up is in charge of the fire; students are not involved in the building/feeding process. We have firm boundaries around the fire (practice our fire rules, do not allow children to run or play close to the fire, designated fire ring with designated seating area, strict attention to ratio in order for the fire builder to not be responsible for watching the children.”
“Safety of course and communication about fire play. These words together do not communicate safety of children in a childcare setting. They also intrinsically bring up fear for people.”
“When we have a fire, we want it to be safe, enjoyable, and interesting for the children and parents/ caregivers. Careful management of the risk has minimized concern.”
“Creating an environment that promotes respect for fire and safety while not creating fear.”
“There is always a concern that a child may get burned. We try to make sure that doesn't happen through a variety of safety measures, but no fire is always safer than having a fire. But we believe that risk is worth the benefits.”

A few responses had concerns around the terms fire and play together: “I am very strict with fire at my school. I would never consider it play when fire is involved. We are intentional and have a lot of structure around fire usage.” Another said, “Again I would not consider the experiences with fire to be play. Experiential-yes. Exploratory- yes. Play-no.’” and “The issue is that you’re considering this as a form of play.”

Research Question: What best practices can be gleaned from other early childhood educators using fire in their settings?

From Question 35, respondents who allow fire play shared additional fire safety habits, showing the typical precautions that programs use (see Table 12).

Table 12. *Fire Safety Habits*

Additional Fire Safety Habits	Allow Fire Play
	n=153 total respondents
Supervision of fire area	127 (83.0%)
Practice safety rules and protocol around fire	126 (82.4%)
Use walking feet near fire/no running	123 (80.4%)

Designated area for fire	122 (79.7%)
Have first aid kit available	118 (77.1%)
Use of fire safety circle	111 (72.6%)
Thoroughly put out fire	111 (72.6%)
Keep fire extinguishing equipment available, such as a bucket of water or sand, hose, fire blanket, or fire extinguisher	108 (70.6%)
Clear ground of flammable items around fire area	108 (70.6%)
Teacher/student ratio considerations	106 (69.3%)
Clear area of tripping hazards	104 (68.0%)
Shoes are always required when engaging with a lit fire	91 (59.5%)
Verify with weather services/app to see if conditions are safe for fire lighting	80 (52.3%)
Tie back hair and loose clothing	78 (51.0%)
Implementing a benefit risk analysis of your fire setting	69 (45.1%)
All municipal fire regulations are followed	61 (39.9%)
Use of protective equipment around fire, such as fire gloves or potholders	58 (37.9%)
One teacher one risk	51 (33.3%)
Verify with fire department to see if conditions are safe for fire lighting	27 (17.7%)
Have a fence around the fire pit	9 (5.9%)
Other (please specify)	20 (13.1%)
Note: Respondents could choose more than one fire safety habit.	

Ten of the 20 "other" respondents mentioned they do not use an actual flame as part of fire play. One respondent wrote, "I can't continue if it's going to be called fire play." One mentioned, "The fence is a new concept for us based on push back from local licesning [sic] around a specific interpretation of a regulation. We have been doing fires for 20+ years in out [sic] program and theis [sic] new regulation is burdensome and does not see the capable child or the ability fo [sic] the adult to act as a sheild [sic]." As noted in Table 12, best practices around fire included: supervision of the fire area, practicing safety and fire rules, using walking feet near fire, having designated areas for fire, having a first aid kit available, using a fire safety circle, thoroughly putting out the fire, having fire extinguishing materials nearby, and clearing the nearby ground of flammable materials. Additional practices are noted in Table 12.

While respondents share many reasons for allowing fire play, the largest response for allowing fire play is to build and practice safety skills. Additionally, fire play has the potential to impact 21st century and other skills. If a program desires to include open flame as part of fire play, best practices noted from programs include:

- Fire Play Activity Development—Develop a rationale for why fire play should be used in your setting.
- Safety Guidelines—Create, implement, and follow safety guidelines that address all policy, procedures, concerns. Have conversations around safety parameters and how the program meets and exceeds safety, without the elimination of flame, around fire. Do the work to have the hard conversations.
- Training—Develop training that informs, demonstrates, and evaluates the use of fire play activities for teachers and staff.

- Developmentally Appropriate Practices—Adapt fire safety to developmental needs of children.
- Benefit/Risk Assessments—Use benefit/risk assessments for the program with continual assessment of risky play in the setting.
- Parent Education—Seek parental buy-in by communicating and educating parents on the benefits of embracing fire play.
- Environmental Concerns—Understand the developmental, local, and environmental issues around fire and limit fire as needed depending on local environmental needs.

Discussion

Based on the survey responses, analysis of quantitative data, and review of the qualitative comments provided, key themes based on the three research questions were established. The researchers made recommendations that will allow further consideration and development on fire play. Although defined for the purpose of this study and included at the beginning of the survey, the term "fire play" caused confusion and concern in minimal participants. While not directly asked, according to the demographic information collected, some programs that allow fire may not be licensed, limiting access to fire play for many children. Several participants did not view fire as a loose part; however, the survey opened up possibilities and they were curious to explore it more. A more expansive view of what fire play entails and relation to risky play and application with loose parts is necessary.

Safety is of the utmost importance and a common theme throughout the survey. The respondents for both the "no" and "yes" tracks agreed that it is important to teach children about fire safety in the event of a real emergency. By having loose parts materials and activities, children can act out and practice what they do in various emergency situations. Additionally, those who allow fire play are practicing more diverse safety protocols than those who do not allow fire play. They are doing the traditional fire safety practices plus going above and beyond with practical, hands-on fire safety practices.

Recommendations for Future Studies

Although this study provides impactful information on early childhood educators' perspectives on fire play, there are many areas where further investigation would add value to embracing fire as a loose part. Recommendations for future research and studies include looking at fire as part of risky play more specifically, the tension of using fire as a tool versus loose parts, international and indigenous perspectives, regional differences, mental health concerns, air quality issues, connections to wildfires, licensing and institutional requirements, and environmental impact. Professional development could include a certification to train and demonstrate the educator can lead fire play sessions to satisfy restrictions from outside influences.

Fire is used as a tool for cooking, heating, prescribed burns for land management, and other uses worldwide. As a tool, there may be strict parameters around the safety and use of fire. However, when viewing fire as a loose part, there may be a broader interpretation of how fire might be handled by children, wondering whether fire is being used as a tool or loose part in fire play situations. Of course, safety should be paramount in both situations. Exploring the paradox between using fire as a tool or loose part could help understand this topic better.

A convenience sampling research method was used to investigate the use of fire as a loose part and different research methods to gain unique perspectives are needed. Studies that also concentrate on a certain type of early education setting or specific representation of early education providers could add value to this important topic. Although not a direct question, several of the selections, open-ended questions, and "other" responses mentioned the religious, indigenous, ritual, and community aspects of fire play. Further research in how/why fire is used in these situations would add value to diversity and equity aspects of fire. By not allowing fire play with safety parameters, most children are missing out on learning essential skills of how to interact appropriately with fire, including the needed safety skills acquired by interacting with fire in safe spaces. Equity with fire play should also be addressed in future studies.

Emotional, social, and environmental factors could influence the use of fire play in educational settings. Recent events, local community occurrences, and personal circumstances for educators, children, and parents might impact this topic. Extreme mental health situations where there might be more propensity toward fire setting need further examination.

While not thoroughly investigated in this study, rules, restrictions, licensing, and program development were factors for many educators' use of fire play in their setting. Understanding how rules and licensing impact the use of fire play is needed. A follow up study could help provide further guidance and direction.

Limitations

Additional research and future studies are necessary to add value and a deeper understanding to this significant topic. The study included a diverse mix of early childhood educators, types of education settings, and geographic locations; however, international perspectives, indigenous views, and regulators' standpoints would add value. There could be a bias due to the method of convenience sampling for the study. Those educators who do allow fire play seem to have fewer licensing restrictions, perhaps because they are in settings that do not require licensing. Also, there was a higher response rate from college/graduate school participants so further inquiry as to why and its impact on the survey results. Our survey did not explore all avenues of topics that could impact fire play, such as deliberate fire setting by individuals that should be working with mental health providers.

Conclusion

Using a convenience sampling technique, this study investigated fire as a loose part in early childhood settings. Current NBECE practices and educators' concerns around fire in early childhood settings, along with safety and other considerations for fire play were examined. As a result of this research study, recommendations and best practices for incorporating fire as a loose part in a safe way in early childhood settings were formulated. Fire play, when it is allowed, can be done safely, thoughtfully, and carefully.

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