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'It's Very Spooky in Here': young children's fears and anxieties in the natural environment

Carie Green 

School of Education, Counseling, and Human Development, South Dakota State University, Brookings, SD, USA

ABSTRACT

Although nature is recognized as a setting that stimulates children's joy and wonder, few studies have examined the negative emotions that children experience in nature. This qualitative study explored 4–5-year-old Alaskan children's emotional, behavioural, and cognitive expressions of fear and anxiety during an outdoor excursion. Data was collected through sensory tours, in which children were equipped with wearable cameras while they explored. Findings revealed that half of the 20 children expressed fear and anxiety. Four themes (physical discomfort, trouble navigating, imagined danger, feeling scared and lost) characterized children's fearful encounters. Children created fearful situations by imaging monsters, snakes, and alligators. Encountering dark and fallen limbs, navigating the tall grass and a slippery boardwalk provoked feeling lost and scared. Children self-regulated their fearful experiences through self-talk and staying close to one another. By paying attention to children's fearful emotions, adults can better support children's formative experiences in the natural world.

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Introduction

Emotions shape experiences and how one comes to see oneself in relation to the natural world. From happy and elated to frustrated and angry, from confident and motivated to frightened and withdrawn, affective states shape children's lived interactions in an environment (Boyer, 2014). Although nature has long been recognized as a setting that stimulates children's joy and wonder (Carson, 1956; Wilson, 2018), less attention has been given to the negative emotions that children experience in natural settings (Bixler, Carlisle, Hammitt, & Floyd, 1994). Given emotions shape one's experiences and behaviour in an environment (Boyer, 2014), it is crucial to explore both positive and negative emotional interactions that children have during outdoor (nature) experiences. Thus, the purpose of this paper is to explore young children's emotional, behavioural, and cognitive experiences of fear and anxiety in a wilderness.

Fear and child development

Fear, is generally recognized as 'a distressful emotion,' associated with anxiety and discomfort, and caused by real or imagined danger (Merriam-Webster, 2019). Fear is a normal part of child development and a 'positive adaptive force when it teaches children an awareness of potential danger' (Nicastro & Whetsell, 1999, p. 392). Fear bias, or recognition of fearful expressions, emerges in infancy around 7-months of age (Grossmann & Jessen, 2017). Around the same time, normal separation anxiety emerges among infants when they become separated from an attachment figure

(Keeton, Schleider, & Walkup, 2017). Common fears in early childhood include fear of the dark, monsters, and strangers (Keeton et al., 2017; Nicastro & Whetsell, 1999). In middle childhood, fears become associated with social competency – making friends and attending school (Keeton et al., 2017; Nicastro & Whetsell, 1999).

Just as children have been said to have a natural affinity towards nature (Sebba, 1991), they have also been stated to have ‘instinctual’ fears of potentially dangerous natural elements (Andrews & Gatersleben, 2010). For example, animals, plants, unpredictable weather conditions, unfamiliar sounds, encountering strangers, dark and fallen branches, the supernatural or the unknown and the novelty or strangeness of an environment may evoke a fearful response to a perceived threatening condition (Bixler & Floyd, 1997; Du et al., 2012; Van den Berg & Ter Heijne, 2005;). Fear of getting lost has also been found to be common, even when children are accompanied by teachers and other adults (Bixler et al., 1994). Fearful emotions experienced in nature have also been related to other negative emotions including disgust and discomfort (Bixler et al., 1994; Bixler & Floyd, 1997).

Research has found that wild animals are a commonly stated fear of children (Bixler et al., 1994; Bixler & Floyd, 1997; LoBue & DeLoache, 2008; Loxton, 2009; Maurer, 1965). For example, children perceive animals like, spiders, sharks, and bears as scary (Schuttler, Stevenson, Kays, & Dunn, 2019). Research with infants has shown that fear of snakes to be an inherent predisposition of humans, rather than a learned behaviour (Thrasher & LoBue, 2016). Children in Western cultures often hold fears of nonindigenous animals and predators (e.g. lions and tigers) in which they are highly unlikely to encounter in daily life (Strommen, 1995). Such fears may be attributed to a child’s difficulty differentiating between real and imaginary dangers at early developmental stages (Nicastro & Whetsell, 1999). Media (movies, TV, and books) has also played a role in influencing children’s fears in nature (Maurer, 1965; Bauer, 1974).

Fear and cognition

Fear, as an emotional response, is always coupled with a cognitive element. In other words, perceived danger refers to cognitive appraisal of a situation (real or imaginary) as dangerous, scary, or threatening (Andrews & Gatersleben, 2010). Psychologists have argued that ‘normal fear’ is an ‘integral and adaptive aspect of [human] development with the primary function of promoting survival’ (Gullone, 2000, p. 429). That is, fear is inherent in the human condition and instigates either a fight or flight response to an impending dangerous situation.

On that note, the prospect-refuge theory explains ‘why certain environments feel secure and meet basic human psychological needs’ (Dosen & Ostwald, 2013) and why other environments are perceived as dangerous invoking a fearful response. This theory postulates that environments that are less accessible (such as a densely wooded areas) contain a higher level of refuge for a potential offender and have a lower level of prospect for escape for a potential victim (Appleton, 1975). While this theory has been tested on adult perceptions of fear and danger in stimulated natural environments (Andrews & Gatersleben, 2010), it has not yet been applied to naturalistic studies of children in natural settings.

Fear, as an emotional response, is neither good nor bad, it is how such anxieties are negotiated, or overcome, that ultimately inform one’s capacity to adapt to a given situation or environmental condition. Fear, accompanied with cognitive awareness of potential dangers and appropriate strategies for negotiating those dangers can be a ‘positive self-preserving’ and ‘self-enhancing quality’ (Nicastro & Whetsell, 1999, p. 392). Healthy fear and appropriate cognitive appraisal of a given situation can also alert an individual for the need to escape from impending danger when necessary (Silverman, La Greca, & Wasserstein, 1995).

Fear, however, unaccompanied without sound reasoning can be debilitating (Nicastro & Whetsell, 1999). Additionally, when children are exposed to severe and prolonged fearful conditions, they are at greater risk for developing maladaptive emotional responses (Keeton et al., 2017). Fear conditioning may also negatively impact children’s development and the associations a child forms with an

environmental context. Fear conditioning occurs when an aversive stimulus is paired with a neutral context or stimulus, resulting in an expression of a fear response to an originally neutral context (Phillips & LeDoux, 1992). For example, a child gets caught up in a wild rosebush (aversive stimulus) when playing in a wooded area near his house (originally a neutral context). As a result of his fright, the child will no longer go into the wooded area when he plays outside. If not addressed, this element of fear conditioning could negatively influence his exploration and perception of wooded areas not only near his house but in other environmental settings. Indeed, childhood nature experiences were found to be a strong predictor of disgust sensitivity to, and fear expectancy for, outdoor activities later in life (Sugiyama, Hosaka, Takagi, & Numata, 2021).

Cognitive perception of danger does not always coincide with a fearful response. As Andrews and Gatersleben (2010) explain, 'some sources of danger (e.g. extreme sports) may actually be perceived as attractive by some individuals, particularly if these dangers derive from nature' (p. 474). Thus, an individual might seek out dangerous conditions for the thrill they provide. For young children, nature experiences are often intertwined with elements of imaginary play (Green, 2011, 2013, 2016a, 2016b; Green, Kalvaitis, & Worster, 2016). Thus, it is quite conceivable that children may conjure up dangerous situations in nature for the purpose of evoking a fearful response. Take for instance children's attraction to spooky stories or haunted houses. Perhaps, a distinguishing factor of attraction to imaginary dangerous or scary situations is when children can cognitively discern what is real and what is make-believe. In early childhood, such discernment is still emerging as research has shown that younger children (four and five years) have a greater fear of monsters and ghosts than those slightly older (five and six years) (Nicastro & Whetsell, 1999). While studies have noted the psychological and social benefits of children's imaginary play in natural settings (Chawla & Rivkin, 2014; Dowdell, Gray, & Malone, 2011; Fjørtoft, 2001; Green, 2011, 2013, 2015), little research has addressed how imaginary perceptions of danger influence emotional and behavioural experiences of natural settings (Green 2016a, 2016b, Green et al., 2016).

Fear and learning theories

Cognitive appraisal can also be used as a learning strategy in situations where fear conditioning has occurred to help children regulate negative emotional reactions (Hinton, Miyamoto, & Della-Chiesa, 2008). Through this process, a child can be guided to reevaluate the environmental context and identify strategies to help navigate a difficult or challenging feature in an environment. Adults play an important role in reducing stress or fear through supporting children in communicating their difficulties, establishing an environment where it is okay to make mistakes, and helping children develop strategies to cope with and overcome difficult situations (Hinton et al., 2008). For instance, in the example of a child's conditioned fear of the woods, an adult may invite the child to verbalize his fears, help him to identify the rosebushes in the environment, and teach him how to wear appropriate clothing so as not to get snagged and to step around or over the prickly thorns. Equipped with skills and strategies, the child can develop a stronger sense of confidence in that environment.

Self-regulation, or the ability to control emotions and behaviours, interact positively with others, and engage in independent activities, is also learned during the early childhood years (Bronson & Bronson, 2001). Effective self-regulation forms the basis for later emotional responses and behaviours. With guidance from adults, children not only learn how to constructively express their emotions; they also acquire the skills necessary to overcome difficult situations (Cole, Armstrong, & Pemberton, 2010). Cultural norms and standards guide emotional expressions, including what behaviours and actions are acceptable and unacceptable within various settings (Boyer, 2014; Morelli & Rothbaum, 2007). Little has been written about children's emotional regulation in nature. While some have discussed nature as a restorative setting for processing and regulating one's feelings (Kaplan, 1995; Korpela, Hartig, Kaiser, & Fuhrer, 2001), none have discussed how young children learn to regulate their emotions and behaviours in response to natural stimuli. In

this research, children's self-regulation in response to their fearful emotions or cognitive appraisal of a scary situation will be examined.

Research on children's fears in nature have mostly occurred in controlled settings (Thrasher & LoBue, 2016). Few studies have explored children's experiences of fear during nature explorations (Bixler et al., 1994; Bixler & Floyd, 1997). In the studies that have examined children in natural setting, data collection has primarily consisted of surveys and inventories, and/or adult observations collected *after* an excursion (Bixler et al., 1994; Bixler & Floyd, 1997). Data collected apart from the setting may not fully portray understanding of children's lived experiences of fear in that environment. That is, children's self-reported fears may be very different than what evokes fear and anxiety during their lived experiences. Indeed, researchers have argued for new methods to 'discover rather than prescribe how children reason about emotions in everyday life' (Ruba & Pollak, 2020, p. 521). This study uses qualitative methods, namely, wearable cameras, to examine children's lived experiences of fear during free play and exploration in a natural setting.

Research purpose and questions

This research examines young children's expressed emotions of fear and anxiety and the perceived condition (real or imaginary) that evoked such emotions during a class outing to a migratory bird refuge. Children's behavioural responses to such emotions will be examined, including how fear was negotiated or overcome. Recognizing that the process of overcoming physical and psychological challenges in nature have been shown to lead to a sense of enhanced well-being and self-esteem (Kaplan & Kaplan, 1989), thus, a secondary purpose of this study was to examine if and how educators, adults, and/or peers supported children in developing self-regulation in response to fears and anxieties expressed in nature. This research aims to answer the following questions: What fear-related emotions did preschool children express in the different settings (open fields, wetlands, and boreal forests) of a migratory bird refuge? What did children cognitively perceive as scary or dangerous in these settings? How did children self-regulate their behaviours in response to their fearful experiences?

Methods

The research presented in this paper constitute part of a larger multiple-method longitudinal project on the emotional and behavioural processes of Alaskan children's environmental identity development in outdoor wilderness settings. Findings were primarily generated through a qualitative approach involving both inductive and deductive processes.

Study site and participants

Twenty children from a private preschool participated in the project. Approximately 40% of the children were identified as White/Caucasian by their parents. The remaining students represented diverse mixed-ethnic backgrounds including Alaska Native, Asian, Black/African American, and Hispanic/Latino. Additionally, some of the children's families were military, temporarily stationed in Alaska. Other children came from families that had lived in Alaska nearly all their lives. Parental informed consent and child assent were attained prior to research participation. Each child was assigned a pseudonym, which are used throughout this paper. The study was approved by the institutional review board in which the researcher was affiliated. The author reports there are no competing interests to declare.

The children along with their teachers and parent volunteers were bused to a local migratory bird refuge for approximately one hour of free play and exploration on two separate occasions in the fall of 2018. The refuge contains open fields, wetlands, and boreal forest habitat (see map). The natural recreational site is open to visitors year-round and contains several miles of trail. The first visit was

overcast and cloudy with scattered showers. The second visit was a bit chillier with misty rain. A few children had previously visited the refuge with their families; others had never been.

Data collection

In this study, sensory tours was used as a data collection method (Green, 2016a). Children were invited to wear small video cameras around their forehead during their play and exploration. The small wearable camera goes where children go, sees what children see, and captures their self-talk and expressions during their play and exploration of the outdoor setting (Green, 2016a). Video from the wearable cameras revealed children's expressions of fear through their self-talk and interactions with their peers, parents, and teachers in the settings.

Four wearable cameras were circulated between 20 children, until every child (if they desired) had an opportunity to wear a camera. Camera rotation was opportunistic to avoid disrupting children's activities and movement. Children were invited to wear the camera for as long as they wished. Therefore, the length of each child's videos ranged between two to seventeen minutes. Additionally, the researcher collected iPad videos and photographs of the children, providing an alternative angle of their activities.

During a first round of analysis, the researcher, along with her graduate and undergraduate research assistants, viewed each video, taking careful notes of children's emotional and behavioural interactions with their peers, teachers, and environmental features. A theme of 'scary nature' was noted during this initial cycle. Initial analysis revealed that 10 out of 20 children expressed some degree of fear/anxiety/discomfort during their outdoor excursions. The research team then isolated children's fearful interactions into shorter video clips for transcription and further analysis.

In a second cycle of analysis, children's fearful interactions were transcribed in detail to include not only the child's verbal and behavioural responses, but also the context in which their fearful interactions occurred. The research team reviewed the transcripts and the shorter video clips in detail, noting which children were involved, the emotions exhibited, how emotions influenced behaviours, self-regulatory strategies, and/or interventions that supported children in overcoming their fearful and/or anxious encounters (see Table 1). The research team utilized inter-rater reliability to validate and strengthen findings. Namely, descriptive findings were discussed among the research team to establish consensus on interpretation. Through multiple viewings of the videos and repeated readings of the transcripts, four prominent themes emerged from the data that characterized children's fearful and anxious encounters in the natural settings of the migratory bird refuge.

Findings

Children's fearful and anxious encounters in nature were characterized under four overarching themes: physical discomfort, trouble navigating, imaginary encounters, and feeling scared and lost. While the themes provide an overarching framework for categorizing children's experiences, the children did not respond to fear-evoking situations in the same way. In other words, their emotional, behavioural, and self-regulatory strategies varied along with the level of support provided by their peers and adults. Table 1 reveals 15 fearful and anxious encounters, occurring in five outdoor contexts: in the tall grass, on the slippery bridge, in the water under the bridge, on the trail in the forest, and off-trail in the forest. Children's verbal expressions of fear and how they responded to one another are included in the table. Children's emotional states were inferred through their verbal and in some instances their non-verbal expressions. For example, while Christopher only muttered 'ow' when he tripped over a log, his heavy breathing, grunting, signing and slow uncertain movements revealed his distress and anxiety. Additionally, Table one also reveals the ways in which children self-regulated their fears. Self-talk was common as well as slow and careful movements and peer proximity. Less common strategies included running, growling and howling and singing. Two children succumb to verbal complaints and avoidance. In the sections

Table 1. Children's verbal expressions, emotional states, self-regulatory strategies for negotiating fearful and anxious encounters in nature.

Themes	Context of fearful experience	Children	Verbal expressions	Emotional states	Self-regulatory strategies	Peer or adult intervention	Tension negotiated?
Physical discomfort	Tall grass	Joseph	'Dirty, dirty, dirty!'	Distress and sadness	Self-talk and crying	Researcher wiped hands and invited him to wear camera	Yes
	Tall grass	Jennifer	'I do not like getting wet!'	Distress and anger	Self-talk and verbal complaint to teacher	Teacher explained others were wet too.	No- Expressed discomfort
Trouble navigating	Slippery bridge	Joseph	'How to go up?'	Anxiety	Self-talk, slow and careful movements, and peer proximity	none	Yes
	Slippery bridge	Matthew	'It's slippery on here.'	Anxiety	Questioning, self-talk, slow and careful movements, growling, howling, and running	Parent encouragement and coaching	Yes
	Slippery bridge	Daniel	'This is REally scary!'	Fear	Self-talk, laughter, growling, and running	None	Yes
	Off-trail in the forest	Christopher	'Ow.'	Distress and discomfort	Heavy breathing, slow uncertain movements, sighing and grunting	None	No- subsequent avoidance
	Off-trail in the forest	Daniel	'I'm not going again'	Distress, frustration, and anger	Verbal complaint, whining, grunting, and groaning	None	No- subsequent avoidance
	Off-trail in the forest	Daniel	'I'm not going again'	Distress, frustration, and anger	Verbal complaint, whining, grunting, and groaning	None	No- subsequent avoidance
Imagined danger	Tall grass	Ashley Matthew Brittany	'There might be sss ... snakes.' 'Yes, I can see them!' 'I saw them already.'	Excitement	Peer play and imagination	Researcher tries to clarify if children really saw them.	Yes
	Water under the bridge	Matthew Brittany Ashley Daniel	'There's an alligator in there!' 'Don't fall in!' 'I can' 'I can't see under the bridge'	Excitement Excitement Excitement Anxiety	Peer play and imagination Verbal complaint	Researcher asked if alligators lived in Alaska.	Yes No- subsequent avoidance
		Brittany	'Go in the water and it's gonna be so wet!'	Excitement	Peer play and imagination	David corrected his peers stating, 'there are only fish' in the water.	Yes
		Ashley	'If you go in the water there are ghosts!' 'Or a jellyfish'	Excitement			
		Daniel	'I'm never going down there!' 'There must be a meateater.'	Fear and Anxiety	Verbal complaint		No- Expressed avoidance
	Water under the bridge	Jennifer	'I'm never going down there either.'				

(Continued)

Table 1. Continued.

Themes	Context of fearful experience	Children	Verbal expressions	Emotional states	Self-regulatory strategies	Peer or adult intervention	Tension negotiated?
Scared and lost	Water under the bridge (2nd visit)	Daniel	'I hate down there ... because I'll get sick.'	Anxiety and Disdain	Verbal complaint	None	No- Expressed hate
	Off-trail in the forest	Joseph	'It's very ... bad here.'	Fear and Anxiety	Self-talk, slow and careful movements, peer proximity	None	Yes
		Matthew	'there might be alligators!'				
	Tall Grass	Robert	'It's very spooky in here!' 'We're lost!'	Fear and Feeling Lost	Self-talk, singing, peer proximity	None	Yes
	On-trail in forest	Matthew	'ITS SCARY!'	Fear and Feeling Lost	Self-talk, yelling for help, growling, howling, and running	Teacher encouraged that he was safe.	Yes
	Off-trail in forest	Stephanie	'It's so spooky'	Fear and Excitement	Peer proximity, slow and careful movements	None	Yes
	Off-trail in forest	Amanda	'It looks scary ... ' 'It's really sloppy'	Fear and Confidence	Parent proximity, slow and careful movements	None	Yes
		Daniel	'This is really bad, we are lost!'	Fear and Anxiety	Verbal Complaint	None	No- Persistent anxiety

that follow, qualitative descriptions are presented under each theme to provide insight into young children's lived experiences of fear in nature. Children's words are italicized to highlight their voices and perspectives.

Discomfort

Two children expressed physical discomfort related to walking through the tall grass. Joseph feared getting dirty and Jennifer was distraught about getting wet.

'Dirty, dirty, dirty..' Joseph repeated, weeping in the grass.

The researcher comforted and reassured him by wiping off his hands and inviting him to wear the camera. Joseph eventually calmed down and stopped crying. Like Joseph, Jennifer complained after walking in the rain-soaked grass.

'I do not want to be more wet. I do not like getting wet! Too wet and wet and wet ... Wet. I do not like wetness,' Jennifer said, 'I got wet again. This is not what I wanted. I do not like getting wet ... I do not like to be wet and wet and wet.'

'I'm soaked,' Jennifer told her teacher.

'You're soaked too? So is Brittany,' her teacher said.

'I'm soaked,' Jennifer repeated.

Rather than expressing sadness, Jennifer reacted to her discomfort with exasperation and a hint of anger. Like Joseph, Jennifer used self-talk to negotiate her feelings. Her teacher offered reassurance by stating that others were wet too. Yet Jennifer repeated her complaint.

Trouble navigating

Other children expressed anxiety in navigating difficult terrain including an incline on the narrow and slippery wooden boardwalk.

'How to go up? Uh oh, going up. How to go up ... without slipping?' Joseph asked.

Jennifer walked carefully in front of Joseph, and together they made it over the incline without slipping.

Similarly, Matthew, walked hesitantly behind Samantha and her mother:

'I made it over here,' Matthew said.

'Yes,' Samantha's mother answered.

'It's slippery on here,' Matthew said, slowing down.

'Yes, be very careful, walk in the middle,' Samantha's mother directed.

Matthew walked carefully. Once across, he growled and ran until he came to a second small bridge.

'Oh no, how are we supposed to get past here now?' Matthew paused, before reassuring himself, 'I know how to get past here ... just gonna be careful.'

'Slowly, slowly, okay?' Samantha's mother encouraged.

He slowly crossed then growled, hummed, and stomped his feet before chasing after his peers again.

Daniel also slowed down to walk on the wooden path.

'Hugh, this is REally scary..' Daniel said. He crossed to the dirt trail, before coming to the second wooden bridge.

'Hugh?' Daniel said, 'two bridges.'

'He ... ha, ha, ha, ha ... grrrr ... howl ... ' Daniel's laughter turned to growling as he neared the end of the bridge and joined Matthew in his chase.

Others expressed fear and anxiety navigating off-trail in the forest.

Following his classmates off trail, Christopher proceeded cautiously over and around downed trees. He moved more slowly and sluggishly than his peers. He had difficulty keeping up and eventually he was left behind to navigate the fallen limbs alone. Christopher held his arms out in front of him, balancing carefully as he took large steps over loose and slippery branches. His heavy breathing became heavy; he sighed and grunted. Despite his cautious movements, he tripped and fell over a log, verbalizing only a quiet, 'Ow.' He soon got up and redirected his course after noticing his peers had taken a shorter route back to the wooden bridge through a patch of bushes.

Christopher's non-verbal (grunts and sighs) indicated his difficulty. After reaching the trail, Christopher refused to further explore with his peers. Additionally, when the group revisited the forest several days later, Christopher refused to explore. He stayed on a bench and near an adult the entire time.

Likewise, Daniel exhibited self-defeating behaviour while navigating the forest:

'Now what, we don't know the way to the bridge,' Daniel said.

'I see it!' James noted.

'Me too, me too, me too,' Daniel said.

Daniel noticed the platform of the boardwalk was as high as his waist.

'I can't get up! I can't get up!' he whined.

'Why?' James asked.

'Because of that!' Daniel pointed at the tall platform.

Daniel grunted and groaned as he climbed onto the boardwalk. Later when his peers ran into the forest, Daniel refused.

'I'm not going again. I'm gonna wait here ... Goodbye friends,' he stated.

Both Christopher and Daniel were overcome by their difficulties navigating off-trail, so much so, that they refused to further explore.

Imagined danger

While some children's fear and discomfort were concrete, others were imaginary:

'There might be sss ... snakes,' Ashley warned her friends.

'Yes, I can see them,' Matthew played along.

'I saw them already,' Brittany added.

The children walked on the dirt path through the grass.

'That's right. ... I need some grass,' Ashley said, panting.

'You eat some grass?' Brittany asked.

'No! Or you want me to push you in the grass ... with snakes,' Ashley threatened.

'... with snakes?' Brittany whispered.

Ashley conjured up the snakes in the grass. Matthew and Brittany played along, pretending to have also seen the snakes. By cognitively imagining snakes in the grass, Ashley attributed the

grass as potentially dangerous. Beyond the tall grass, Matthew continued the game by suggesting dangerous animals in the swampy wetland.

'Do you wanna jump in?' Brittany tested Daniel.

'I can't see under the bridge,' Daniel said.

'Me either,' Brittany said.

'I can,' Ashley said.

'I can,' Brittany mimicked, 'don't fall in!'

'Why?' Ashley asked.

'Just don't,' Brittany stated.

'I can see an alligator. Guys there's an alligator in there,' Matthew said.

'Where?' Brittany asked.

'I can't see it,' child [off camera] responded.

'Because it's under the water and we can't see it,' Matthew said.

'There's an alligator in there? Do alligators live in Alaska?' the researcher asked.

'No,' echoed the children.

By suggesting alligators lived in the water, the children attributed the water as dangerous. The water was indeed murky; however, neither alligators nor snakes live in Alaska. Thus, the children transposed fauna from another environment into this one. Later when Joseph and his peers were exploring in the forest, the fear of alligators once again emerged:

'It's very ... bad here,' Joseph stated as the children ventured over logs.

'There might be alligators under there!' Matthew suggested.

Joseph kept his gaze on the ground.

'Whoah!' he said, carefully stepping over two large branches. He fell behind the other children.

'Wait for me guys!' Joseph shouted.

Joseph perceived the dark broken limbs and gloomy setting as 'bad.' Additionally, Matthew alerted his peers to the danger of alligators.

Along with dangerous animals, children also invented scary ghosts and monsters.

'Go in the water and it's gonna be so wet,' Brittany said.

'If you go in the water there are ghosts ...' Ashley suggested.

'It's really deep down there. I'm never going down there,' Daniel added.

'Me either,' several children retorted.

'I'm never going down there either,' Jennifer agreed.

'There must be a meat eater,' Daniel said.

'Or a jellyfish,' Ashley added.

'now there's fish,' Jennifer said.

'No, there's only fish,' David corrected Daniel.

David then positioned himself in the middle of the group and yelled out, 'HEY GUYS THERE'S NO MEAT EATERS DOWN THERE!'

Ashley, Brittany, Matthew repeatedly suggested dangerous animals and creatures in the water, forest, and grass, which created an element of fear. While the imagined danger provided excitement for these children, for others it provoked anxiety. Three children stated they would never go into the water and David asserted frustration at his peers' misconceptions by stating, 'there's only fish.'

While it is important for children to learn potential dangers in an environment, pervasive negative emotions could lead to avoidance altogether. This was evidenced in Daniel's reaction during a second visit to the water a few days later:

'I would never go down there. I would never go down to the ocean.' Daniel murmured as he walked across the bridge, 'Yuck, I hate down there because all the ... because I'll get sick. I don't wanna get sick.'

Daniel retained negative emotions and perceptions towards the water, expressing hate and that the water would make him sick.

Feeling scared and lost

Others expressed fear coupled with feeling lost.

'Wait for me!' Robert yelled, running through the tall grass to catch his friends, 'I'm trying to go back!'

James and David went in one direction and Robert and Stephanie went in another.

'It's very spooky in here,' Robert said.

'The farmhouse, the farmhouse, where is ... the farmhouse where ...' Robert sung as he stayed close to Stephanie.

'Follow the kids! Run! Run!' Robert shouted, 'We're lost! Let's go out here!'

Robert approached his peers in the bushes, 'We're blocked in here. We're blocked in this path. I wonder why the bus is not coming ...'

He followed his peers who eventually found the old farmhouse, 'We're found! We're found. We found the farmhouse! Ha, ha, ha, we found the farmhouse! Woah look at the tractors!'

Robert described the tall grass as 'very spooky,' and expressed his fear of 'being lost' and feeling 'blocked.' He self-regulated his anxieties by remaining close to his peers, engaging in self-talk, and singing as he sought to find his way 'out.' He rejoiced when he eventually came upon the farmhouse and discovered he was 'found.'

Matthew also expressed fear of being lost in the forest.

'Grr ... Ah ... Hah ... here we go!' Matthew growled, running after his peers.

His teacher yelled from behind for the children to stop and wait.

'It's scary,' Matthew said quietly to himself.

'ITS SCARY!' He yelled back at his teacher.

'No, I just want you to be closer to me,' his teacher said.

'Because it's—we might get hurt?' Matthew asked.

'No. Just so I know where you are. No, you're safe,' his teacher reassured him.

Matthew resumed running, growling, and howling. A few minutes later, however, he yelled, 'WE MIGHT GET LOST!'

Like on the bridge, Matthew ran, howled, and growled as a coping strategy in response to his fears in the forest. Not only was the noise distracting but role-playing a wolf or another animal may have made Matthew and his friends feel stronger and less vulnerable in the environment.

James and Stephanie expressed fear mixed with excitement while exploring the forest.

'I wanna go again!' James said.

'Yeah me too 'cause it's so fun,' Stephanie said.

James led Stephanie into the trees.

'Yeah. EW!' James said, pointing to a broken stump of dark wood.

'Yuck,' Stephanie agreed.

'It's so spooky,' Stephanie said, slowing down. The children were alone in the forest without their peers and teacher.

'Yeah.' James responded.

'But now we're together,' Stephanie said.

'Yeah,' James agreed.

'There they are!' James exclaimed, noticing other children on the trail. He raced towards them. Stephanie moved more slowly, taking careful steps after James.

Likewise, Amanda walked alertly as she explored off trail near her peers.

'It looks scary ...,' Amanda said, stumbling over dark broken limbs, while carefully attending to her feet.

'Sloppy,' a child yelled in front of her.

'It's really sloppy,' Amanda repeated. She made her way around a large tree and nearly tripped.

'Woah, this is really steep.' she said.

'This is really bad, we are lost!' Daniel said.

'No, we're not, somebody is with us,' Amanda reassured him, referring to the parent.

'We are lost!' Daniel exclaimed again.

'No we're not,' Amanda argued.

Then the children made it to the wooden bridge.

'Now we are not lost,' Amanda concluded.

Both Amanda and Stephanie noted that the environment was 'scary' or 'spooky,' yet they remained confident in their abilities to walk over the fallen limbs. They paid close attention to their steps and relied on their peers and a parent for support. Daniel, on the other hand, persisted in feeling lost and later refused to reenter the forest with his peers.

Discussion

Children expressed a range of emotions across the three settings (grassy field, wetlands, and boreal forest) of the migratory bird refuge, including anxiety, discomfort, anger, frustration, worry, distress, excitement, and confidence. While some negative emotions were coupled with negative responses, other fearful perceptions were coupled with excitement and confidence, which aided children considerably in navigating a scary situation. For instance, although Amanda noted that the forest looked

scary, she took careful steps with confidence, and with the companionship of her peer, she successfully negotiated her time off-trail. Findings show that imagining scary creatures in the grass or water prompted excitement among children rather than fear, but this was not the case for all children, a few responded to children's suggestions of frightening creatures with anxiety, expressing a desire to leave and not return to the natural setting all together. This finding shows that one child's game of imagining scary creatures, can contribute to fear conditioning in another.

Cognitive perceptions

What aspects or features of the environment did children cognitively perceive as scary?

Findings from this study coincide with those of previous research (Bixler & Floyd, 1997; Van den Berg & Ter Heijne, 2005). Namely, children attributed dark and fallen branches as 'spooky,' 'scary,' and 'bad.' While past studies involved urban children in middle childhood (Bixler & Floyd, 1997), this study extended the findings to young children (ages 4–5) from a rural Alaskan city. One cannot assume that just because a child is from Alaska, a place where wilderness is ample and pristine, that they will hold fewer fears in the forest. As Andrews and Gatersleben (2010) explained cognitive perceptions of scary situations are always coupled with an emotional response. Like other studies (Bixler et al., 1994), our findings showed that children who perceived the forest as scary also had the feeling of being lost. While fear was most predominately verbalized in the forest, it was also expressed in the tall grass and on the slippery bridge.

Additionally, children in this study exhibited common imaginary fears in early childhood. Specifically, a few children attributed snakes in the tall grass, as well as ghosts, alligators, jelly fish and meat eaters in the water under the bridge. It is not surprising that children suggested snakes as it is a commonly recognized fear for both adults and children (Bixler & Floyd, 1997; DeLoache & LoBue, 2009; Loxton, 2009; Thrasher & LoBue, 2016). However, in suggesting snakes and alligators, the children revealed their lack of knowledge of the native fauna. Namely, there are no known snakes in Alaska and alligators from the bayou could not possibly live in a sub-arctic climate. As Strommen (1995) explained children in Western cultures often hold fears of nonindigenous animals that are unlikely to encounter in daily life. However, one child was aware of what animals inhabited the environment. In response, he adamantly rebuked his peers for conjuring up beings that could not possibly live in the sub-Arctic climate.

Just as adults are attracted to dangerous situations in nature (i.e. extreme sports) for a sense of excitement (Andrews & Gatersleben, 2010), some of the children may have fabricated scary beings in the environment for fun. While it seemed to be a game for some children, attributing dangerous animals to the setting may have invoked very real fears and anxieties for others. Daniel and Jennifer both responded to the posed dangers in the water with avoidance. Both children stated that they would 'never go down there.' Brittany for the most part played along with her peers, although at times it seemed she was not completely certain as to whether or not the creatures were real or imaginary. Indeed, young children have difficulty differentiating between real and imaginary dangers during early developmental stages (Nicastro & Whetsell, 1999).

Trouble navigating

Other children expressed difficulties in navigating through different features of the setting, including the tall grass, the slippery bridge, and fallen logs in the forest. Robert felt 'blocked' in the tall grass. Both Joseph and Matthew were anxious about crossing a section of the wet slippery bridge, and Daniel struggled to 'get up' on the wooden platform. While Christopher did not verbally express his worry, his heavy breathing, sighs, and 'ow' indicated his difficulty navigating through the fallen branches. Indeed, during their exploration off trail, many children expressed fear and anxieties of the dark and fallen branches. Statements such as, 'it's very bad here,' 'it looks scary,' 'it's really sloppy,' 'it's so spooky,' suggested that they perceived the environment as threatening (Bixler &

Floyd, 1997; Van den Berg & Ter Heijne, 2005). While the tensions experienced by the children while navigating their environments may have been related to the novelty of the settings (Bixler et al., 1994; Falk, Martin, & Balling, 1978), expressed anxieties of being 'blocked' might also be explained by the prospect-refuge theory (Appleton, 1975; Dosen & Ostwald, 2013). Certainly, the wooded areas (off trail) of fallen branches were less accessible than the groomed trails and the height of the tall grass at least for some children posed difficulties. This study revealed that those that felt lost repeatedly expressed it, suggesting that such a feeling is persistent rather than temporary.

Physical discomfort

Children's ability to navigate the setting as well as their physical discomfort were also associated with the way that they experienced fear and anxiety in their environments. Jennifer cried about getting wet and Joseph cried about getting dirty after slipping in the tall grass. Both expressed physical discomforts which were overcome through self-talk and the support of a nearby adult. Findings from this research add to understanding about how physical discomfort can contribute to children's fears and anxieties in natural settings, suggesting also the importance of assuring that children are properly clothed and that their physical needs are met.

Negotiation strategies

How are children, alongside their peers and adults, learning to self-regulate their fearful and anxious emotional experiences in the natural world? While previous literature discusses what children fear in their environments and why particular environments might be scary, few, if any studies, have focused on children's negotiation of their expressed fears and anxieties. It is important for children to develop skills of self-regulation to negotiate fearful situations. This study adds insight on the various ways that young children negotiated their fears and/or anxieties in the natural environment. Some negotiation strategies were healthy and effective, while others were self-defeating. For example, both Stephanie and Amanda assessed the off-trail section of the forest as 'scary'; they negotiated this fear by taking the time to carefully step over and around the fallen branches. James navigated over the fallen branches off-trail much quicker than Stephanie. His fast pace, compared to Stephanie's slow careful steps, seemed to be part of his negotiation strategy. Matthew, also established a pace, running quickly, growling, and howling when he felt scared on the trail. This strategy seemed to provide him with a means of strength against his perception of the forest as scary. Jennifer, Joseph, and Robert responded to their fears and anxieties through self-talk. Jennifer's language was very expressive, talking through her feelings about being wet in great detail. Robert sang songs about making it back to the farmhouse safely. For some their anxieties were eased through being near to their peers. Several children expressed comfort in being near one another. Robert stayed close to Stephanie in the tall grass and Stephanie reassured James when he expressed fear off trail, stating, 'but we are together.'

Some children demonstrated negotiation strategies that lead to self-defeat. For instance, Daniel responded to his fears with frustration, 'we don't know the way to the bridge' and 'I can't get up.' While his peers tried to reassure him, ultimately his feelings of inadequacy lead him to avoid exploring his environment altogether. Similarly, Christopher struggled with navigating off trail in the forest and when his peers went back into the bushes to explore, Christopher indicated that he would rather stay behind. Both Daniel and Christopher's discomfort ultimately lead to a desire to leave the environment and on subsequent trips to the forest neither child was particularly excited to be there.

Although adults and peers were nearby to reassure the children, their presence alone was not enough for Daniel, Robert, and Matthew to negotiate their fears. What the findings show is that children may respond very differently to fears. Some fears may lead children to avoid the environment all together, or long to leave the environment. This is a danger. In order to foster a healthy connection with the natural world, it is important to tune in to how children's fears may be manifested. As well, interventions to help children negotiate their fears also need to be tailored to meet each

individual child's specific needs. By paying attention to the fears expressed by children, the self-regulatory strategies in which young children use, adults can better support children in nurturing their positive relationship with the natural world.

Conclusion

This research examined young children's emotional, behavioural, and cognitive expressions of fear and anxiety during a class outing to a migratory bird refuge. Findings revealed that children expressed a wide-range of fear-related emotions, including anxiety, discomfort, anger, exasperation, worry, distress, and avoidance, across the various settings (grassy field, wetlands, and boreal forest). Although the study was based in Alaska, children's fears and anxieties were found to be similar as in other non-Alaskan studies (Bixler et al., 1994; Bixler & Floyd, 1997; LoBue & DeLoache, 2008; Loxton, 2009). For instance, children conjured up snakes and alligators (although neither live in Alaska), expressed fear of dark and fallen branches, and were anxious about getting lost and separated from their peers and other adults. Findings from this study also showed that young children's imagination plays a role in the creation of fearful situations in nature. As well, the use of self-talk and expressive utterances, and the companionship of peers and/or adults assisted children in navigating their fearful and anxious encounters. While most children in this study showed resiliency in overcoming fearful and anxious situations, a few of them did not. Anxiety and difficulty navigating off-trail in the forest prompted some children to avoid that environment all together. Thus, findings reveal the importance of understanding young children's negative emotional encounters to consider ways in which educators and other adults may better support children in developing competencies to navigate environmental challenges and adverse environmental experiences. Indeed, early childhood is a formative time when salient aspects of a person's environmental identity are formed (Green, 2018), findings from this study show that not all nature-based experiences are joyful and wonderful. It is therefore important that early childhood researchers and practitioners pay attention to both positive and negative encounters that children may experience in natural settings. Further research is needed to extend understanding of the diversity and universality young children's formative emotional, behavioural, and cognitive perceptions of the natural world in various environmental, geographical, and socio-cultural contexts.

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Notes on contributor

Dr. *Carie Green* is the Proffitt and DeJong Director of Early Childhood Education at South Dakota State University. Her extensive research and theoretical framework on the emotional and behavioral attributes of children's Environmental Identity Development are well recognized across the globe. Her current research partners with the popular PBS Kids Cartoon, *Molly of Denali*, to study the cultural attributes of children's development of spatial autonomy, environmental competency, and environmental stewardship in rural Alaska Native communities.

ORCID

Carie Green  <http://orcid.org/0000-0002-2923-9117>

References

- Andrews, M., & Gatersleben, B. (2010). Variations in perceptions of danger, fear and preference in a simulated natural environment. *Journal of Environmental Psychology*, 30(4), 473–481. doi:10.1016/j.jenvp.2010.04.001
- Appleton, J. (1975). *The experience of place*. London.: Wiley.
- Bauer, D. H. (1974). Children's fears: Reflection on research. *Educational Leadership*, 3, 555–560.
- Bixler, R., Carlisle, D. L., Hammitt, W. E., & Floyd, M. F. (1994). Observed fears and discomforts among urban students on field trips to wildland areas. *The Journal of Environmental Education*, 26(1), 24–33. doi:10.1080/00958964.1994.9941430
- Bixler, R. D., & Floyd, M. F. (1997). Nature is scary, disgusting, and uncomfortable. *Environment and Behavior*, 29(4), 443–467. doi:10.1177/001391659702900401
- Boyer, G. H. (2014). How might emotions affect learning. In S. A. Christianson (Ed.), *The handbook of emotion and memory: Research and theory* (pp. 3–32). Psychology Press.
- Bronson, M. B., & Bronson, M. (2001). *Self-regulation in early childhood: Nature and nurture*. Guilford Press.
- Carson, R. (1956). *Help your child to wonder*. Released by Council of Liberal Churches (Universalist-Unitarian) Incorporated, Division of Education.
- Chawla, L., & Rivkin, M. (2014). Early childhood education for sustainability in the United States of America. In J. Davies, & S. Elliott (Eds.), *Research in early childhood education for sustainability: International perspectives and provocations* (pp. 248–265). Routledge.
- Cole, P. M., Armstrong, L. M., & Pemberton, C. K. (2010). The role of language in the development of emotion regulation. In S. D. Calkins, & M. A. Bell (Eds.), *Human brain development. Child development at the intersection of emotion and cognition* (pp. 59–77). American Psychological Association.
- DeLoache, J. S., & Lobue, V. (2009). The narrow fellow in the grass: Human infants associate snakes and fear. *Developmental Science*, 12(1), 201–207.
- Dosen, A. S., & Ostwald, M. J. (2013). Methodological characteristics of research testing prospect–refuge theory: a comparative analysis. *Architectural Science Review*, 56(3), 232–241. doi:10.1080/00038628.2013.809689
- Dowdell, K., Gray, T., & Malone, K. (2011). Nature and its influence on children's outdoor play. *Journal of Outdoor and Environmental Education*, 15(2), 24–35. doi:10.1007/BF03400925
- Du, Y. B., Lee, C. T., Christina, D., Belfer, M. L., Betancourt, T. S., O'Rourke, E. J., & Palfrey, J. S. (2012). The living environment and children's fears following the Indonesian tsunami. *Disasters*, 36(3), 495–513. doi:10.1111/j.1467-7717.2011.01271.x
- Falk, I. H., Martin, W. W., Balling, J. D. (1978). The novel field trip phenomenon: Adjustment to novel settings interferes with task learning. *Journal of Research in Science Teaching*, 11, 127–134.
- Fjørtoft, I. (2001). The natural environment as a playground for children: The impact of outdoor play activities in pre-primary school children. *Early Childhood Education Journal*, 29(2), 111–117. doi:10.1023/A:1012576913074
- Green, C. (2011). A place of my own: Exploring preschool children's special places in the home environment. *Children, Youth, and Environment*, 21(2), 118–144.
- Green, C. (2013). A sense of autonomy in young children's special places. *International Journal of Early Childhood Environmental Education*, 1(1), 8–33.
- Green, C. (2015). Because we like to': Young children's experiences hiding in their special places. *Early Childhood Education Journal*, 43(4), 327–336. doi:10.1007/s10643-014-0663-4
- Green, C. (2016a). Sensory tours as a method for engaging children as active researchers: Exploring the use of wearable cameras in early childhood research. *International Journal of Early Childhood*, 48(3), 277–294. doi:10.1007/s13158-016-0173-1
- Green, C. (2016b). Monsters or good guys: The mediating role of emotions in transforming young children's encounters with nature. *Canadian Journal of Environmental Education*, 21, 125–144.
- Green, C. (2018). Children's environmental identity development in young children: Negotiating inner and outer tensions in natural-world socialization. In J. Dillon & C. Russell (Eds.), *[Re]thinking environmental education series*. New York, NY: Peter Lang.
- Green, C., Kalvaitis, D., & Worster, A. (2016). Recontextualizing psychosocial development in young children: A model of environmental identity development. *Environmental Education Research*, 22(7), 1025–1048. doi:10.1080/13504622.2015.1072136
- Grossmann, T., & Jessen, S. (2017). When in infancy does the “fear bias” develop? *Journal of Experimental Child Psychology*, 153, 149–154. doi:10.1016/j.jecp.2016.06.018
- Gullone, E. (2000). The development of normal fear: A century of research. *Clinical Psychology Review*, 20(4), 429–451. doi:10.1016/S0272-7358(99)00034-3
- Hinton, C., Miyamoto, K., & Della-Chiesa, B. (2008). Brain research, learning and emotions: Implications for education research, policy and practice 1. *European Journal of Education*, 43(1), 87–103. doi:10.1111/j.1465-3435.2007.00336.x
- Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. Cambridge University Press.
- Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology*, 15(3), 169–182. doi:10.1016/0272-4944(95)90001-2

- Keeton, C. P., Schleider, J. L., & Walkup, J. T. (2017). Separation anxiety, generalized anxiety, and social anxiety. In B. Sadock, V. A. Sadock, & P. Ruiz (Eds.), *Kaplan & Sadock's comprehensive textbook of psychiatry* (10th ed., pp. 3708–3719).
- Korpela, K. M., Hartig, T., Kaiser, F. G., & Fuhrer, U. (2001). Restorative experience and self-regulation in favorite places. *Environment and Behavior*, 33(4), 572–589. doi:10.1177/00139160121973133
- LoBue, V., & DeLoache, J. S. (2008). Detecting the snake in the grass: Attention to fear-relevant stimuli by adults and young children. *Psychological Science*, 19(3), 284–289. doi:10.1111/j.1467-9280.2008.02081.x
- Loxton, H. (2009). Monsters in the dark and other scary things: Preschoolers' self-reports. *Journal of Child & Adolescent Mental Health*, 21(1), 47–60. doi:10.2989/JCAMH.2009.21.1.7.809
- Maurer, A. (1965). What children fear. *The Journal of Genetic Psychology*, 106(2), 265–277. doi:10.1080/00221325.1965.10533109
- Merriam-Webster. (2019). *Fear*. In Merriam-Webster.com dictionary. Retrieved March 29, 2021, from <https://www.merriam-webster.com/dictionary/fear>.
- Morelli, G. A., & Rothbaum, F. (2007). Situating the child in context: Attachment relationships and self-regulation in different cultures. In S. Kitayama, & D. Cohen (Eds.), *Handbook of cultural psychology* (pp. 500–527). New York, NY: Guilford Press.
- Nicastro, E. A., & Whetsell, M. V. (1999). Children's fears. *Journal of Pediatric Nursing*, 14(6), 392–402. doi:10.1016/S0882-5963(99)80068-2
- Phillips, R. G., & LeDoux, J. E. (1992). Differential contribution of amygdala and hippocampus to cued and contextual fear conditioning. *Behavioral Neuroscience*, 106(2), 274. doi:10.1037/0735-7044.106.2.274
- Ruba, A. L., & Pollak, S. D. (2020). The development of emotion reasoning in infancy and early childhood. *Annual Review of Developmental Psychology*, 2, 503–531. doi:10.1146/annurev-devpsych-060320-102556
- Schuttler, S. G., Stevenson, K., Kays, R., & Dunn, R. R. (2019). Children's attitudes towards animals are similar across suburban, exurban, and rural areas. *PeerJ*, 7, doi:10.7717/peerj.7328
- Sebba, R. (1991). The landscapes of childhood: The reflection of childhood's environment in adult memories and in children's attitudes. *Environment and Behavior*, 23(4), 395–422. doi:10.1177/0013916591234001
- Silverman, W. K., La Greca, A. M., & Wasserstein, S. (1995). What do children worry about? Worries and their relation to anxiety. *Child Development*, 66(3), 671–686. doi:10.2307/1131942
- Strommen, E. (1995). Lions and tigers and bears, oh my! Children's conceptions of forests and their inhabitants. *Journal of Research in Science Teaching*, 32(7), 683–698. doi:10.1002/tea.3660320704
- Sugiyama, N., Hosaka, T., Takagi, E., & Numata, S. (2021). How do childhood nature experiences and negative emotions towards nature influence preferences for outdoor activity among young adults? *Landscape and Urban Planning*, 205, 103971. doi:10.1016/j.landurbplan.2020.103971
- Thrasher, C., & LoBue, V. (2016). Do infants find snakes aversive? Infants' physiological responses to "fear-relevant" stimuli. *Journal of Experimental Child Psychology*, 142, 382–390. doi:10.1016/j.jecp.2015.09.013
- Van den Berg, A. E., & Ter Heijne, M. (2005). Fear versus fascination: An exploration of emotional responses to natural threats. *Journal of Environmental Psychology*, 25(3), 261–272. doi:10.1016/j.jenvp.2005.08.004
- Wilson, R. (2018). *Nature and young children: Encouraging creative play and learning in natural environments*. Routledge.