Abstract

LITTLE, SARAH E. Wild Boys of the Creek: Autonomous Exploration of a Leftover Space in Raleigh, NC (Under the direction of Professor Art Rice).

Research suggests that the amount of time children spend engaging with nature is decreasing (Juster, Ono, & Stafford, 2004; Karsten & van Vliet, 2006; Rideout, Foehr, & Roberts, 2010). The trend of today’s children being less connected to nature than previous generations is troubling since children experience developmental benefits when connected to nature. This trend did not apply to a group of children in Raleigh, NC. From 2002 to 2006, a group of boys played in an urban creek across from Emma Conn Elementary School in Raleigh, NC. For generations before and since, children played in the creek after school; however the play behavior of this group of boys differed from other generations. The play evolved into the creation of a tribal society completely separate from adults. Once the boys graduated from elementary school; however the tribal system did not persist. The boys continued to visit the creek periodically, but explored others parts of Raleigh.

What began as a grounded theory investigation of children engaged with nature in Raleigh, NC yielded an unexpected finding. Through video analysis, semi-structured interviews (N = 5; 3 boys and 2 parents), memo writing, and a physical environment description, a grounded theory investigation was conducted to understand the cohort’s urban creek experience. It was found that the most meaningful experience may have been the level of autonomy granted to the cohort through the play in the creek and rather than the impact of nature alone.

With the autonomy, the cohort spent their free time exploring a creek in Raleigh, NC and eventually expanded into other areas of Raleigh. Their wonderful autonomous experiences in nature facilitated the creation of a fantastical world separate from adults, the formation of long-term friends, the opportunity to develop good judgement skills, a desire to explore in emerging adulthood, and the formation of strong place attachment of which nature was a key component. This leftover space, this natural remnant within the urban environment facilitated the autonomous exploration of the cohort and afforded a developmentally valuable experience. Perhaps, the design of green space in the urban environment needs to be considered as the design of environments that have the potential to foster development and promote autonomy and decision making.
Wild Boys of the Creek: Autonomous Exploration of a Leftover Space in Raleigh, NC

by

Sarah E. Little

A dissertation submitted to the Graduate Faculty of North Carolina State University in partial fulfillment of the requirements for the degree of Doctor of Philosophy

Design

Raleigh, North Carolina

2016

APPROVED BY:

Professor Art Rice, Committee Chair

Dr. Nilda Cosco

Dr. Lynne Baker-Ward

Professor Kofi Boone
Dedication

I want to dedicate this document to the extraordinary parents and children who played in Cemetery Branch from 2002-2006. The wonderful stories they generously shared kept my momentum going until completion. Their experience inspired me, and I hope it will inspire others.

To my supportive parents, Jim and Mary Little, who taught me that anything is possible with hard work. To my wonderful sister, Rachel Harkey, who talked me off the cliff more than once. To my supportive colleagues at the University of Oklahoma, Leehu Loon and Tom Woodfin, who pushed me to finish and protected me from service commitments. Lastly, in memory of Dean Charles Graham who took a chance on hiring a Ph.D. student in hopes that she would finish.
Biography

Sarah Little grew up on a 100-acre farm in rural North Carolina where she spent her free time exploring nature with her older sister, Rachel. Fond memories include fishing and swimming in Rocky River, evading a stampede of cows, finding arrowheads, and exploring the ravine in search of fairies. Her childhood in nature made a lasting impression.

While working on her MLA at NCSU, Sarah was one of the first student workers for Robin Moore and Nilda Cosco at the Natural Learning Initiative where she learned about the influence of the natural environment on child development. What began as a good paying job for a poor graduate student turned into a passion that would fuel a career. Sarah pursued a career in landscape architecture upon graduation where she practiced in the greater Charlotte, NC metro area.

After a 10 year hiatus from school and careful planning with her mentors, Robin and Nilda, Sarah decided to pursue a Ph.D. in Design where she formally studied the influence of nature on child development.

Currently, Sarah is a registered landscape architect in North Carolina and an assistant professor at the University of Oklahoma. She also hates to refer to herself in the third person.
Acknowledgements

No dissertation can happen without the support and guidance of a dream team of a committee. I am most grateful to my advisor, Art Rice. He is a quantitative researcher at heart but was willing to join me on this qualitative endeavor. Not being a nature convert, he will forever be the voice of the rival hypothesis in the back of my mind as I write. He also proved to be an incredible mentor in my teaching career. I also want to thank Dr. Nilda Cosco for her many years of mentoring and service on my committee. She consistently pushed me to relate the research to inform the design of the physical environment. Her expertise was invaluable. Dr. Lynne Baker-Ward proved to be a very kind and extremely knowledgeable mentor. I remember the first day of PSY 584 when I felt so completely out of my comfort zone, but Dr. Baker-Ward reassured me and encouraged me to stay. I am glad I followed her advice. The knowledge gained from her class was vital to the dissertation research. Kofi Boone who proved to be a life-saver on the committee served as a valuable mentor in showing me how to manage an effective studio.

Beyond the committee, several others were instrumental to my PhD studies. I want to thank Gene Bressler who supported me with a GA position which provided valuable teaching experience, Carla Delcambre who mentored me in the studio environment along with Kofi, and Karla Henderson for her efforts early in the process. I want to thank Robin Moore and Dr. Nilda Cosco for an employment opportunity which funded my Ph.D. studies. I also want to thank Susan Chin, Executive Director of the Design Trust for Public Space, for the clarity she provided and guidance on the hardest part of the dissertation: creating a title which of course changed.

Last but certainly not least, I want to thank my Ph.D. cohort: Adina (the mildly inappropriate Oracle), Muntazar, Zahra, Jong, Zhai, George, Aliaa, Luis, Ozlem, Mhsen, Mahsen, Ahoo, Nasim, Noosha, Robby, Ece, Christoph, and TJ. Your support and camaraderie was a critical component of the process.
TABLE OF CONTENTS

LIST OF TABLES ......................................................................................................................... xi

LIST OF FIGURES ........................................................................................................................ xii

Chapter 1: Problem Statement ................................................................................................. 1
  1.0 Introduction .......................................................................................................................... 1
  1.1 Definitions .......................................................................................................................... 3
  1.2 Research Site Context ........................................................................................................ 3
    1.2.1 North Carolina ............................................................................................................. 3
    1.2.2 Raleigh, NC .................................................................................................................. 3
    1.2.3 The Neighborhoods: Mordecai and Oakdale .............................................................. 5
    1.2.4 Emma Conn Elementary School ............................................................................... 6
    1.2.5 Cemetery Branch, Raleigh, NC ............................................................................... 7
  1.3 Theoretical Perspective ...................................................................................................... 9
    1.3.1 Expanding the Discussion of Environment-Behavior (E-B) to Include Environment-
         Development (E-D) ........................................................................................................... 10
    1.3.2 Kurt Lewin and the Environment-Behavior (E-B) Relationship ............................... 10
    1.3.3 Gilbert Gottlieb and Probabilistic Epigenesis (PE) .................................................. 11

Figure 1-8: Metatheoretical model of probabilistic epigenesis ................................................. 14
    1.3.4 Environment-Development (E-D) Relationship ......................................................... 15

Chapter 2: Literature Review ..................................................................................................... 17
  2.0 Introduction ....................................................................................................................... 17
  2.1 General Literature Review Protocols ................................................................................ 17
  2.2 Literature Review 1: The Influence of Socialization on Nature ....................................... 18
3.1 Grounded Theory ............................................................................................................. 40
3.2 Operationalization of Socialization and Nature ............................................................. 41
3.3 Research Methods .......................................................................................................... 41
  3.3.1 YouTube Video Analysis ............................................................................................. 43
    3.3.1.1 A Priori Coding .................................................................................................... 44
    3.3.1.2 Coding Procedure ............................................................................................... 44
  3.3.2 Semi-structured Interviews ......................................................................................... 45
    3.3.2.1 Interview Procedure ............................................................................................ 45
    3.3.2.2 A Priori Coding .................................................................................................. 46
  3.3.3 Memo-writing ............................................................................................................ 46
  3.3.4 Physical Environment Description ............................................................................ 49
    3.3.4.1 Location .............................................................................................................. 49
    3.3.4.2 Physical Characteristics .................................................................................... 49
    3.3.4.3 Temporal Considerations ................................................................................. 49
  3.4 Research Participant Recruitment .................................................................................. 49
  3.5 Research Participants ..................................................................................................... 50
    3.5.1 Rose, Tom, and Chris .............................................................................................. 50
    3.5.2 Donna, Matt, and Mickey ...................................................................................... 51
  3.6 Qualitative Quality Standards ....................................................................................... 52
    3.6.1 Transferability: Thick Description .......................................................................... 52
    3.6.2 Credibility and Confirmability: Triangulation ....................................................... 53
    3.6.3 Confirmability: Reflexivity ..................................................................................... 54
Chapter 4: Findings ............................................................................................................. 55
4.0 Introduction ............................................................................................................................................ 55
4.1 YouTube Video Analysis ....................................................................................................................... 55
4.2 Interview Findings ................................................................................................................................. 58

4.2.1 Question 1: How did socialization influence the engagement with nature of the study cohort playing in Cemetery Branch between 2002 and 2006? ................................................................. 58
  4.2.1.1 Attachment .................................................................................................................................. 58
    4.2.1.1.1 The Secure Base of Exploration ......................................................................................... 60
    4.2.1.1.2 The Opportunity to Develop Good Judgement ................................................................. 61
  4.2.1.2 Hierarchical ............................................................................................................................... 64
    4.2.1.2.1 Control over Time Spent ................................................................................................. 64
    4.2.1.2.2 Rejection of Control ........................................................................................................... 66
    4.2.1.2.3 Control of the Opportunity to Engage with Nature ......................................................... 66
  4.2.1.3 Social Identity ............................................................................................................................ 68
    4.2.1.3.1 Expanding ‘Value Playing in Nature’ to ‘Value Autonomous Exploration’ .......... 69
    4.2.1.3.2 Scaffolding ......................................................................................................................... 71
    4.2.1.3.3 Distinguish among Peers .................................................................................................. 71
    4.2.1.3.4 Expanding ‘Find Friends’ to include ‘Find Long-term Friends’ ................................. 73
  4.2.1.4 Reciprocal .................................................................................................................................. 73
    4.2.1.4.1 Leadership ......................................................................................................................... 74
    4.2.1.4.2 Facilitators ......................................................................................................................... 74
  4.2.1.5 Question 1 Summary: How did socialization influence the engagement with nature of the study cohort playing in Cemetery Branch between 2002 and 2006? .............................................. 75

4.2.2 Question 2: How did nature influence social interaction of the study cohort playing in Cemetery Branch between 2002 and 2006? ......................................................................................... 77
4.2.2.1 Themes Consistent with the Literature Review .................................................. 78

4.2.2.1.1 Affords Social and Cooperative Play ......................................................... 78

4.2.2.1.1.1 The Tribal Society .................................................................................. 79

4.2.2.1.2 Creek Currency and ‘The Shops’ Area ..................................................... 80

4.2.2.1.3 Playing with a Consistent Group of Friends. ............................................. 81

4.2.2.1.2 Supports Autonomy .................................................................................. 81

4.2.2.1.3 Affords an Opportunity for Social Interaction .......................................... 82

4.2.2.1.4 Creates Social Ties ................................................................................... 83

4.2.2 Expands ‘Reduces Aggression’ to ‘Facilitates Conflict Resolution’ .............. 84

4.2.2.3 Question 2 Summary: How did nature influence social interaction of the study cohort playing in Cemetery Branch between 2002 and 2006? ................................................ 85

4.2.3 Question 3: How did the physical environment influence the bidirectional relationship study cohort playing in Cemetery Branch between 2002 and 2006? ...................... 86

4.2.3.1 Location ........................................................................................................ 86

4.2.3.2 Physical Characteristics ................................................................................ 87

4.2.3.2.1 Water as an Attractant ............................................................................ 88

4.2.3.2.2 Containment ......................................................................................... 89

4.2.3.2.3 Wild Quality ........................................................................................ 92

4.2.3.2.4 Secluded and Private ............................................................................ 92

4.2.3.2.5 Networks ............................................................................................ 93

4.2.3.3 Temporal Considerations ........................................................................... 95

4.2.3.3.1 The Loss of ‘The Shops’ ................................................................. 95

4.2.3.3.2 The Addition of Benches .................................................................... 98
4.2.3.4 Question 3 Summary: How did the physical environment influence the bidirectional relationship of the study cohort playing in Cemetery Branch between 2002 and 2006? ….. 102

4.3 Summary ……………………………………………………………………………………………………………………………….. 103

Chapter 5: Discussion………………………………………………………………………………………………………………….. 105

5.0 The Influence of Autonomy ……………………………………………………………………………………………………….. 105

5.1 Socialization → Nature and Autonomy: Home Range …………………………………………………………………………… 107

5.1.1 Home Range ………………………………………………………………………………………………………………………. 107

5.1.2 Home Range and a Shift in the Balance between Natural and Urban ………………… 110

5.1.3 Home Range and Walk Score ………………………………………………………………………………………………….. 111

5.2 Nature → Socialization and Autonomy: Playing with a Consistent Group of Friends and the Tribal Society ……………………………………………………………………………………………………………………………….. 112

5.2.1 Playing with a Consistent Group of Friends ……………………………………………………………………………………… 113

5.2.2 Autonomy and the Rise and Fall of the Tribal Society ……………………………………………………………………….. 113

5.2.3 Autonomy and the Negative Social Interactions …………………………………………………………………………….. 115

5.2.3.1 The Negative Interactions with Creek Neighbors ………………………………………………………………………... 115

5.2.3.2 The Negative Interactions with Other Caregivers ………………………………………………………………………... 116

5.2.4 Outcomes of the Influence of Autonomy: Development of Judgement and Desire to Explore Autonomously ……………………………………………………………………………………………………………………………….. 117

5.2.4.1 Development of Judgement Skills ………………………………………………………………………………………… 118

5.2.4.2 The Desire to Explore …………………………………………………………………………………………………………… 119

5.3 The Nuance of Autonomy ………………………………………………………………………………………………………….. 119

5.3.1 Autonomy and Child Development ……………………………………………………………………………………………. 120

5.3.2 Barriers to Autonomy ……………………………………………………………………………………………………………. 122

5.3.2.1 Barriers to Autonomy: Stranger Danger ……………………………………………………………………………………… 122
Appendix 1.1: IRB Informed Consent for Caregivers ................................................................. 151
Appendix 1.2: IRB Informed Consent for Emerging Adults ......................................................... 152
Appendix 1.3: Results of Literature Review 1 ........................................................................ 153
Appendix 1.4: Results of Literature Review 2 ........................................................................ 154
Appendix 1.5: Results of Literature Review 3 ........................................................................ 155
LIST OF TABLES

Table 1-1: “Preferences of Mallard Ducklings in Simultaneous Auditory-Choice Test”
(Gottlieb, 1991, p. 38).........................................................................................................................13

Table 2-1: Tally of occurrences of examples of social domain relationships involving CAREGIVER
and PEER influence on engagement with nature..................................................................................20

Table 2-2: Data totals from the Bixler, James, and Vadala series of articles......................................31

Table 2-3: Articles and the corresponding themes regarding the influence of nature on social
interaction.................................................................................................................................................33

Table 3-1: Utilization of multiple methods to investigate the research questions. .........................43

Table 3-2: Behavior coding matrix of YouTube video analysis.........................................................45

Table 4-1: Time stamp analysis of the study cohort’s activity in the YouTube video.........................56

Table 4-2: The occurrence of engagement with nature and social interaction with peers. ...............57
LIST OF FIGURES

Figure 1-1: Map of the United States with Raleigh, North Carolina highlighted. ........................................... 4

Figure 1-2: Downtown Raleigh and the cohort neighborhoods are circled by I-440 beltline. ....................... 5

Figure 1-3: Map of research site context ............................................................................................................. 6

Figure 1-4: Map of research site, Mordecai Neighborhood, and Conn ES. .................................................. 7

Figure 1-5: The study cohort playing in the creek as children .......................................................... 8

Figure 1-6: As the cohort age, they ventured from the creek into Downtown Raleigh ................................. 9

Figure 1-7: Timeline of prenatal devocalization technique (Gottlieb, 1991, p. 36) .................................... 11

Figure 1-8: Altered mallard ducklings who could only hear a chicken call during incubation prefer the chicken call over their species call upon hatching. Modified from (Gottlieb, 1991, p. 37) .... 12

Figure 1-8: Metatheoretical model of probabilistic epigenesis (Gottlieb, 2007, p. 2). ............................ 14

Figure 2-1: Basic themes pertinent to attachment relationships ........................................................... 22

Figure 2-2: Basic themes pertinent to hierarchical relationships .............................................................. 23

Figure 2-3: Basic themes pertinent to social identity relationships ............................................................ 27

Figure 2-4: Basic themes pertinent to reciprocal relationships ................................................................. 29

Figure 2-5: Basic themes pertinent to the role of nature in fostering positive social interaction ........... 34

Figure 3-1: Operationalization of socialization and nature ............................................................................. 42

Figure 3-2: Interview guide for the children in the study cohort ................................................................. 47

Figure 3-3: Interview guide for the caregivers in the study cohort .............................................................. 48

Figure 3-4: Research participants (shaded dark gray) and the creek play timeline .................................... 51

Figure 4-1: Autonomous exploration afforded the opportunity to develop good judgement .................. 60

Figure 4-2: The opportunity to engage with nature, the rejection of caregiver control, and caregiver control over how the cohort spends their time ................................................................. 65

Figure 4-3: The cohort finetune two themes (highlighted) identified in the Literature Review .............. 69
Figure 4-4: The leadership theme is meaningful for the study cohort. ........................................ 75

Figure 4-5: Findings from the Literature Review and the interviews are similar. ......................... 78

Figure 4-6: 1. The cohort ran down the steep slope (> 10%) along Frank St and accessed the creek here. 2. The cohort were frequently playing in this backyard which caused negative interactions with the property owner. 3. Location of ‘The Shops’. ................................................................. 90

Figure 4-7: Study cohort played on steep slope at the creek along Frank Street; looking east toward Conn ES. Photo taken from the YouTube video (grebo58, 2012) ............................................................. 91

Figure 4-8: Study cohort played on steep slope at the creek along Frank Street; looking north. Photo taken from the YouTube video (grebo58, 2012) ........................................................................................................................................ 91

Figure 4-9: Found object art created by the study cohort. Photo taken from the YouTube video (grebo58, 2012) ........................................................................................................................................ 94

Figure 4-10: Found object art created by the study cohort. Photo taken from the YouTube video (grebo58, 2012). ........................................................................................................................................ 94

Figure 4-11: Found objects are displayed in ‘The Shops’. Photo taken from the YouTube video (grebo58, 2012). ........................................................................................................................................ 95

Figure 4-12: Top—Photograph of ‘The Shops’ area. 1. Dens within an Elaeagnus pungens shrub serve as shops. 2. A shop with found objects displayed on a makeshift shelf. Photos taken from the YouTube video (grebo58, 2012) ........................................................................................................................................ 97

Figure 4-13: Left—The dens within the structure of an Elaeagnus pungens shrub located on private property are separated from the creek when the property owner erects a fence. Right—The entrance to the dens is still visible. ........................................................................................................................................ 98

Figure 4-14: Above—aerial photographs from 03/17/2007 with no benches present. Below—aerial photographs from 03/30/2014 with two benches present. Photographs from Google Earth. ......... 100

Figure 4-15: The entrance to ‘The Shops’ area, highlighted in red, is visible from the benches. ...... 101

Figure 5-5: Map of the cohort’s home range. 1. Cemetery Branch (research site). 2. Oakwood Cemetery. 3. Hillsborough Street business district. 4. Downtown Raleigh and the railroad tracks. .. 109
Figure 5-6: As the cohort age, home range expands and the balance between natural and urban environments shifts. ................................................................. 111

Figure 5-7: The study cohort’s home range areas from Figure 5-4 transposed unto a Walk Score Map modified from www.walkscore.com/NC/Raleigh. ................................................................. 112

Figure 5-8: A pattern emerges from the findings; the cohort orbit around a fixed point. ............... 125

Figure 5-9: “The tripartite model of place attachment” (Scannell & Gifford, 2010, p. 2). ............... 129

Figure 5-10: The tripartite model of place attachment organizes the experience of the cohort ....... 131

Figure 5-11: “Integrated model of human attachment and place attachment” (Morgan, 2010, p. 15) 133

Figure 5-12: The integration of human and place attachment conforms to the bidirectional relationship. Modified from (Morgan, 2010, p. 15) ................................................................. 133

Figure 5-13: Modified “Integrated model of human attachment and place attachment” (Morgan, 2010, p. 15) ............................................................................................................. 135
Chapter 1: Problem Statement

1.0 Introduction

As a child, connecting with water was a treasured activity. Fond memories of my family's farm include swimming and playing in the river with my sister and neighborhood friends and fishing in my grandfather's pond on an adjacent farm. Family road trips were often interrupted to stop and play in any accessible river which crossed our path. A creek flowed through the playground of my elementary school. Recess was spent concocting magic potions of mud and leaves on a 'stove' which was actually the root system of a large oak tree growing along the creek bank spilling into the water.

These were magical moments as a child. Unfortunately, opportunities for children to connect with water and nature may be limited for myriad reasons. Research suggests that the amount of time children spend engaging with nature is decreasing. One study documents that between 1981/1982 and 2002/2003 time spent outdoors decreased by 50% for children between the ages of 6-17 years old (Juster, Ono, & Stafford, 2004). A study in Amsterdam found that playing outside has decreased in frequency, duration, and type of activity engaged by comparing the recollections of childhoods in the 1950's and 1960's to contemporary childhoods (Karsten & van Vliet, 2006). Engagement with technology has replaced time spent outdoors. One study documents that in 2009 children between the ages of 8 to 18 years old spent 7.5 hours per day engaged with multi-media, i.e., TV, music/audio, computer, video games, print, and movies (Rideout, Foehr, & Roberts, 2010). The 'per day' quantity was based on the average over the course of a week. Therefore in 2009, children 8 to 18 years old spent 52.5 hours per week engaged with technology. Considering that an average adult work week is 40 hours, engagement with technology has become a full-time obsession for children.

Today's children seem to have less free time than previous generations. Time spent in school and studying has increased contributing to the loss of free time. In the United States, children ages 6-17 years old spent an average of 36.5 hours per week at school or studying in 2002-2003 and 29 hours per week in 1981-1982, which represents a 25.9% increase (Juster et al., 2004). For children, school and studying has become the equivalent of a full-time job. Research also suggests that most children experience more time in structured adult-led activities when compared to children from previous generations. Between 1981 and 1997 in the United States, a child's free time dropped by
almost 25% which is possibly due to an increase in time spent in structured activities (Burdette & Whitaker, 2005). Parents strongly influence a child’s time to contain more structured activities and less unstructured free time. In the United States, Lareau (2002) found that the middle-class children who participated in the study spent twice the amount of time in structured activities than working-class children and over triple the amount than poor children. Not only were these activities structured, they were controlled and directed by adults (Lareau, 2002). This loss of a child’s free time due to participation in structured, adult-controlled activities is a middle-class phenomenon attributed to concerted cultivation, which is the attempt of middle-class parents to foster their child’s interests through participation in structured or extracurricular activities (Lareau, 2002). Bodovski and Farkas (2008) confirmed Lareau’s theory that concerted cultivation is positively and strongly associated with parental socio-economic status (SES).

The trend of today’s children being less connected to nature than previous generations is troubling since children experience developmental benefits when connected to nature. Research links separation from nature to many negative outcomes for development, such as obesity due to poor eating habits (Blair, 2009; Koch, Waliczek, & Zajicek, 2006; Ratcliffe, Merrigan, Rogers, & Goldberg, 2011) and lack of physical activity (Baranowski, Thompson, DuRant, Baranowski, & Puhl, 1993; Fjørtoft, 2001; Larson et al., 2009; Sallis, Prochaska, & Taylor, 2000), myopia or near-sightedness (Guo et al., 2012; Jones et al., 2007; Rose et al., 2008; Sherwin et al., 2012; Wu, Tsai, Hu, & Yang, 2010), allergies and low immunity (Ege et al., 2007; Riedler et al., 2001; von Mutius & Vercelli, 2010; Yazdanbakhsh, Kremsner, & Ree, 2002), and lack of concentration (Kuo & Taylor, 2004; Taylor & Kuo, 2009; Taylor, Kuo, & Sullivan, 2001).

Given the anecdotal benefit of playing in a creek and the benefits identified by research of children connecting with nature, the aim of the dissertation research was to investigate the experience of contemporary children playing in a creek. In Raleigh, NC around 2002, a group of children started playing in the portion of Cemetery Branch across Brookside Dr. from Emma Conn Elementary School (Conn ES) most days after school for several hours. The activity happened because the caregivers granted the children the autonomy to decide how they wanted to spend their time after school. In addition to the social environment (caregivers), the physical environment
supported the children’s autonomy. The creek environment inspired the children to create a tribal society separate from adults. Stories of the tribal society delighted caregivers ensuring the continuation of the autonomy. A grounded theory investigation studied the creek play in Cemetery Branch which occurred during 2002-2006 to assess the variables of the social environment that influenced the engagement with the physical environment and the variables of the physical environment that influenced interaction within the social environment.

1.1 Definitions

The researcher utilized several key terms throughout the dissertation. Before constructing an argument, several terms used in the dissertation need clarification.

- **Nature**: any outdoor space where natural elements are present (Kaplan and Kaplan, 1989).
- **Socialization**: the impact of social interaction on development (Grusec & Davidov, 2010).
- **Autonomy**: Piaget (1997) in regards to the recognition of rules of a game defines autonomy as an existence where a child transitions from heteronomy, where decisions/judgments are imposed by an outside source, to autonomy, where decisions/judgments are made independently of authority and existing social rules.

1.2 Research Site Context

1.2.1 North Carolina

Birthplace of the first English child born on American soil, home to Blackbeard the pirate, and site of the first manned flight, North Carolina has a varied and rich history. One of the original 13 colonies, North Carolina is located in the eastern United States bordered to the north by South Carolina, to the south by Virginia, to the west by the Great Smoky Mountains, and to the east by the Atlantic Ocean (see Figure 1-1). The research site occurs in Raleigh lies in eastern North Carolina.

1.2.2 Raleigh, NC

Established in 1792 as a planned city, Raleigh, known as the City of Oaks, is the capital of North Carolina and county seat of Wake County (Peters, 2006). Due to its surrender during the Civil
War, the built environment of Raleigh was spared from the destruction that was experienced by Atlanta, GA and Columbia, SC (Peters, 2006). The estimated population of North Carolina is 9,943,964 people (U.S. Census Bureau, 2014). Charlotte, NC is the largest metropolitan area with a population of 809,958, Raleigh is the second largest at 439,896, and Greensboro is the third largest at 282,586 (U.S. Census Bureau, 2014). Of the three largest cities in NC, Raleigh has the greatest density with 2,826.3 people per square mile in 2010; Charlotte has 2,457.1 people/square mile and Greensboro has 2,131.5 people/square mile (U.S. Census Bureau, 2014).
Raleigh is defined by a beltline, I-440, which circles downtown, the participants’ neighborhoods, and the research site (see Figure 1-2).

![Figure 1-2: Downtown Raleigh and the cohort neighborhoods are circled by I-440 beltline.](image)

1.2.3 The Neighborhoods: Mordecai and Oakdale

Just north of downtown Raleigh are the historic neighborhoods of Mordecai and Oakdale (see Figure 1-3). In 1785, Joel Lane built the original structure to celebrate the marriage of his son, Henry (Mordecai, n.d.). Upon the marriage of Margaret, Henry’s oldest daughter, to Moses Mordecai, the plantation structure is known as the Mordecai House. For nearly 200 years, five generations of descendants of Joel Lane occupy the Mordecai House (McNeely, 2012). In the late 1890s and early 1900s, Patty Mordecai, the second to last heir living in the house, begins selling the plantation acreage for housing developments (City of Raleigh, 2014). Oakdale was originally part of the Mordecai neighborhood. While the neighborhood plat dates to 1891, houses are constructed mainly
between 1920 and 1940. In 1968, the city of Raleigh recognizing the historical significance purchased the house and the remaining 3.2 acres of land for a park which opened in 1972 (City of Raleigh, 2014).

With the downtown Raleigh revival beginning in early 2000, the Mordecai neighborhood is experiencing renewed interest (Mordecai, n.d.) and was recognized as one of the top 5 best neighborhoods in Raleigh based on walkability scores (Cross, 2013).

1.2.4 Emma Conn Elementary School

Emma Conn Elementary School (Conn ES) opened on January 3, 1955 and became a magnet school in fall 1982. Magnet schools are free to attend within a public school system and have a specialized focus, typically Science, Technology, Engineering, and Mathematics (STEM); International Baccalaureate; or Arts (Magnet Schools of America, 2013). Conn ES concentrates on
six main areas: art, dance, drama, music, physical education, and technology, and creates an age-specific curriculum within each focus (Conn Magnet Elementary School, 2014). Wake County adopted the magnet school model to reinforce Common Core learning and eliminate high concentrations of poverty (WCPSS, n.d.). In 2012, enrollment was 636, and the student body consisted of 34.9% white, 49.7 African-American, 1.7% Asian, 7.2% Hispanic, and 6% two or more races; 43.2% of the student body received free or reduced lunch which classifies Conn ES as a Title I school (SchoolDigger, n.d.). In 2014, Magnet Schools of America recognized Conn ES as a Magnet School of Excellence which represents the highest level of recognition (Magnet Schools of America, 2013).

1.2.5 Cemetery Branch, Raleigh, NC

The research site is the portion of Cemetery Branch across Brookside Dr. from Emma Conn Elementary School (Conn ES) in Raleigh, NC. The portion of Cemetery Branch under investigation flows through the Mordecai neighborhood just northeast of downtown Raleigh (see Figure 1-4). Cemetery Branch spurs off Crabtree Creek at Capital Boulevard and flows to New Bern Avenue.

Figure 1-4: Map of research site, Mordecai Neighborhood, and Conn ES.
For generations, children played in the creek most days after school (see Figure 1-5). The researcher became aware of the activity from a YouTube video choreographed to The Who’s “Baba O’Riley” (grebo58, 2012). Donna, a parent of two boys who played in the creek, created the video from a collection of photographs to present the video at a conference. The video started with the cohort playing in the creek as elementary school students.

As the video progresses, the boys grew older, and their play evolved. The video ended with the boys skateboarding and congregating in the abandoned warehouses and parking decks of Downtown Raleigh as teenagers (see Figure 1-6). The video documented the evolution of the boys’ play. As children playing in the creek, they used found objects as currency in barter negotiations, constructed rafts to float along the creek, climbed trees, and explored nature and themselves. Then as teenagers, they continued to enjoy autonomous and unstructured play within the urban environment. As their play evolved, they evolved as emerging adults.

Figure 1-5: The study cohort playing in the creek as children. Photo taken from the YouTube video (grebo58, 2012).
Figure 1-6: As the cohort age, they ventured from the creek into Downtown Raleigh. Photo taken from the YouTube video (grebo58, 2012).

The creek was a metaphor for the boys' coming of age. When they were young, their home range was limited. They played in the creek in a small localized area across Brookside Dr. from Conn ES. Then as they matured/aged, they explored up and down the creek independently. With each passing year, their home range expanded from this small localized area. They followed the creek exploring the urban environment until ultimately they expanded into skateboarding in parking decks, climbing abandoned warehouses, and sleeping in travel hammocks strung in the ancient magnolias in Capital Square in downtown Raleigh. The creek was a timeline of the boys' maturation. The creek became their guide from middle childhood into teenagedom. Just like our early ancestors followed water on their nomadic travels, the boys followed the creek on their travels toward adulthood.

1.3 Theoretical Perspective

The research is guided by the work of Gilbert Gottlieb and Probabilistic Epigenesis (PE) and uses PE to expand the environment-behavior (E-B) relationship to include development. Gottlieb
connected the E-B relationship to neural and genetic activity. The design of the physical environment is more significant than determining what a person does (behavior) because it may influence who a person becomes (development).

1.3.1 Expanding the Discussion of Environment-Behavior (E-B) to Include Environment-Development (E-D)

The E-B relationship is a long standing principle within the field of environmental psychology (Patton, 1990). Historically, psychology viewed the mind as separate and distinct from the world in Cartesian philosophy (Heft, 2013). In other words, the environment had little influence on behavior. Therefore, psychology experiments were traditionally conducted in laboratories, isolated from everyday environments (Heft, 2013). Kurt Lewin was the first psychologist who challenged this paradigm in psychology.

1.3.2 Kurt Lewin and the Environment-Behavior (E-B) Relationship

Lewin was a psychologist at the University of Berlin during the 1920’s and 1930’s. In 1931, Lewin first promoted the influence of the environment on behavior within a chapter he authored in the Handbook of Child Psychology. He proposed the following formula:

\[ B = f(P, E), \text{ where } B \text{ is behavior, } P \text{ is person, and } E \text{ is environment,} \]

which postulated that behavior was a function of the relationship of a person and their environment (Ash, 1992; Bronfenbrenner, 2005). In this formula, Lewin was asserting that behavior was a product of the person-environment interaction. This was the first mention of the environment influencing behavior.

As influential as it proved to be, the formula was limited in that it only referenced behavior. Behavior is fixed in time; it is a snapshot of the interaction between the person and the environment at one instance, whereas development is dynamic and ever changing (Bronfenbrenner, 2005). Development happens over a lifetime; it is the cumulative effect of these snapshots of behavior. This
distinction has profound repercussions for designers of the physical environment. The environment may have the capacity to shape who a person IS and not just what a person DOES.

1.3.3 Gilbert Gottlieb and Probabilistic Epigenesis (PE)

From his dissertation work in 1961, Gottlieb launched his academic career studying imprinting. In his early work, he asserted that imprinting is not dependent on instinct alone, and demonstrated the influence of experience. The early work with imprinting paved the way for probabilistic epigenesis (PE) through the recognition of the influence of experience in development.

In his imprinting studies, Gottlieb developed a prenatal devocalization technique where he altered the vocal chords of a duckling embryo preventing it from vocalizing, i.e., chirping, before hatching (Gottlieb, 1991). Once respiration of the embryo began around day 24, surgical glue was placed on the embryo’s vocal chords (see Figure 1-7). Embryos, both altered with the prenatal

![Timeline of prenatal devocalization technique (Gottlieb, 1991, p. 36)](image)
devocalization technique and unaltered, were placed under different incubation conditions. The first, second, and fifth conditions involved unaltered embryos exposed to different experiences; however all embryos in these conditions heard themselves chirp. In the fifth condition, some unaltered embryos were exposed to chicken calls only, and some were exposed to both chicken and duck calls. The third and fourth conditions involved altered embryos. Embryos in the third condition were isolated and heard nothing. Embryos in the fourth condition were exposed to a chicken call. Once the ducklings hatched, they were placed in a chamber where mallard duck and chicken calls were broadcast from speakers placed equidistant from the duckling (see Figure 1-8). To which call, either duck or chicken, the duckling responded signified to which species the duckling imprinted. Significant findings occurred in the first, second, fourth, and fifth conditions (see Table 1-1). Unaltered ducklings, i.e., embryos who heard themselves, in the first and second condition preferred the mallard duck call (Gottlieb, 1991). Altered ducklings in the fourth condition who only heard a chicken call displayed a preference upon hatching to the chicken call. Unaltered ducklings in the fifth condition who were exposed to both chicken and mallard duck calls preferred the duck call (Gottlieb, 1991). Altered ducklings in the third condition who heard nothing and unaltered ducklings in the fifth condition who heard themselves and a chicken call displayed no significant preference for either the chicken or duck call (Gottlieb, 1991).

The experience of hearing either their species or a different species’ call influenced imprinting. A duckling would not necessarily follow their species’ call upon hatching without the experience of hearing the species’ call before hatching. Experience guided development.

Figure 1-8: Altered mallard ducklings who could only hear a chicken call during incubation prefer the chicken call over their species call upon hatching. Modified from (Gottlieb, 1991, p. 37)
Like imprinting, development is not instinctual and predetermined. The imprinting studies and
the influence of experience on development clarified the nature versus nurture debate. Before
Gottlieb, imprinting was considered instinctual, i.e., genetics determined preference. Nature (genetic
makeup) was important, and nurture (environment) was irrelevant. Gottlieb demonstrated that
imprinting was also a product of experience. In other words, nature did not determine development
alone; nurture played a role. Humans are not prisoners of genetic inheritance; the experience of the
environment also influences development. Both nature AND nurture are important to development as
seen in PE.

‘Epigenetics’ literally translates into ‘above genetics’. Development occurs ‘above’ genetics,
i.e., other factors beyond genetics influence development (Paterson, 2007). ‘Probabilistic’ is in
contrast to ‘predetermined’. Predetermined epigenesis holds that genetic activity determined neural structure and function in a unidirectional relationship (Gottlieb, 2007). In other words, development was determined by genetics only. Gottlieb (2007) disputed this claim and incorporated epigenetic influences in PE to clarify the bidirectional relationship between the environment and behavior with the inclusion of neural and genetic activity. PE views development as the result of bidirectional influences of genetic and neural activity, behavior, and the environment (physical, social, cultural) (see Figure 1-8). Gottlieb’s distinction of the environment as having physical, social, and cultural aspects provides an effective theoretical perspective for design research. In the framework of the dissertation and from the perspective of the researcher as a landscape architect, the physical environment is examined from the standpoint of how it supports the social and cultural environments.

![Bidirectional Influences Diagram](image)

*Figure 1-8: Metatheoretical model of probabilistic epigenesis (Gottlieb, 2007, p. 2).*

In practice, the influence of the environment on development was demonstrated through the Human Genome Project (HGP), an effort which began in 1991 with the goal of mapping and understanding all human genes, i.e., the human genome (NIH, 2015). The hope of the effort was to unlock the secrets to disease and illness stored within our genes. At the onset of the project,
scientists estimated that between 50,000 and 140,000 genes would be mapped because a high number of genes was required to explain the complexity of humans; however scientists discovered only 20,500 genes at the project’s end in 2013 (NIH, 2015). Human complexity was not explained in the number of genes. On a genetic level, rice with 37,544 mapped genes (IRGSP, 2005) is more complex than humans. Obviously, other factors beyond genes are influencing development. The answer was found in epigenetics. Brendtro and Mitchell (2010) explained that “the genes one inherits do not remain static. Throughout life, they are turned on or off by chemical tags that react to signals from the environment” (p. 8). In other words, the environments (physical, social, and cultural) in which we live have the power to activate or deactivate genes. Considering the potential of genes to turn on and off, the 20,500 genes in the human genome quickly increases.

1.3.4 Environment-Development (E-D) Relationship

The bidirectional influence of genetic and neural activity with E-B rendered discussing only environment and behavior inadequate. The influence of the environment to actually turn genes on and off and the consequences on development needed to be incorporated into the E-B discussion. Therefore, the contribution of the physical, social, and cultural environment; behavior, neural activity, and genetic activity on development warrant a revision of the original E-B relationship; behavior is a function of the relationship of a person and their environment:

\[ B = f(P, E), \text{ where } B \text{ is behavior, } P \text{ is person, and } E \text{ is environment.} \]

The revised relationship incorporates the view of Gottlieb regarding the environment, behavior, and neural and genetic activity on development. Development is the function of a bidirectional relationship among environment (physical, social, and cultural), behavior, neural activity, and genetic activity. “Person” from the original formula is replaced with neural and genetic activity since they are endemic to the person. The revised formula is as follows:
\[ D = f (E_{\text{physical}}, E_{\text{social}}, E_{\text{cultural}}, B, NA, GA), \text{ where} \]

\[ D \text{ is development, } E_{\text{physical}} \text{ is the physical environment, } E_{\text{social}} \text{ is the social environment, } \]

\[ E_{\text{cultural}} \text{ is the cultural environment, } NA \text{ is neural activity, and } GA \text{ is genetic activity} \]

or written more concisely:

\[ D = f (E_{\text{physical, social, and cultural}}, B, NA, GA) \]

The revised E-D relationship highlights the impact on development of the physical environment. Designers of the physical environment may have the potential to shape who a person IS and not just what a person DOES.
2.0 Introduction

While development is influenced by the bidirectional relationships between the environment (physical, social, and cultural), behavior, and neural and genetic activity, of interest to the literature review is the bidirectional relationship between the physical and social environments. The physical environment is conceived as relating to natural environments. The social environment is conceived as socialization, or the impact of social interaction on development. Two literature reviews were conducted exploring the bidirectional relationship between socialization and nature. The first literature review focused on the influence of socialization on nature. In this review, the social environment was operationalized as the four domains of social life typical of socialization relationships and nature as engagement with nature. The second literature review focused on the influence of the nature on socialization. In this review, nature was conceived as the natural environment and socialization as social interaction.

2.1 General Literature Review Protocols

The protocols for the two literature reviews were similar. Databases searched were Google Scholar, psycINFO, psycARTICLES, Environmental Sciences and Pollution Management, and the Summon Database which provided access to other databases and journals. Children, Youth and Environments was not part of the databases searched but included in the literature reviews. A search of the citations within the included articles and literature review articles identified additional relevant articles. The following criteria guided the selection of research articles:

- The research had a publication date of 2000 or later.
- Articles were from peer-reviewed journals and not dissertations/theses or conference papers and presentations.
- Research articles contained original data. No literature reviews were included.
- The articles were written in English.
- Participants had direct experiences with nature, i.e., actual physical and unstructured contact with natural elements and physically being in natural settings (Kellert, 2002).
of the dissertation is to inform design practice, only research conducted in the natural environment was considered.

2.2 Literature Review 1: The Influence of Socialization on Nature

This portion of the literature review gleaned knowledge regarding the influence of socialization on engagement with nature. Kaplan and Kaplan (1989) defined nature as any outdoor space where natural elements are present. For this portion of the literature review, ‘nature’ was interpreted as engagement with nature. Articles included in the review consisted of descriptions of children playing with and in natural elements, e.g., climbing a tree, playing with sticks, splashing in water.

2.2.1 Literature Review Protocol of Literature Review 1

Relevant articles were identified utilizing the general protocols; the following criterion was added:

- The articles expressly mentioned engagement with nature. Articles investigating outdoor play/time spent outdoors or physical activity were eliminated if engagement with nature/natural objects was not mentioned.

While physical activity and outdoor play/time spent outdoors were important to study, the focus of this portion of the literature review involved understanding the relationship between socialization influences and engagement with nature. While being outdoors was correlated with increased physical activity levels (Sallis et al., 2000), being outdoors may not be linked to engagement with nature.

Searches utilized combinations of the following key terms: parental influence, nature recreation, nature play, and environmental socialization. Selected articles provided details concerning the influence of socialization on engagement with nature. The greatest sources of data were articles investigating environmental socialization. These articles typically included reflections of childhood pastimes which contributed to their environmental pursuits in adulthood. The search produced 15 articles.
2.2.2 Coding Protocol of Literature Review 1

Within the 15 articles, data pertinent to the socialization→nature relationship were sorted based on socialization influence, either parental/caregiver or peer. Typically the data were qualitative in nature and involved recalled accounts of childhood play. Relevant data contained information regarding parental or peer influence over the research participant’s engagement with nature. Data were coded based on the four domains of social life: attachment, hierarchical, social identity, or reciprocal relationships (Grusec & Davidov, 2010). Data pertaining to the influence of agents of socialization on a child’s engagement with nature were identified and sorted by domain. Once the data were sorted into the relevant domain, similar data were grouped and themes emerged. The themes addressed the ways in which agents of socialization, i.e., caregivers and peers, influenced a child’s engagement with nature.

Attachment relationships refer to the proximity between caregivers and a child during times of stress to protect the child’s welfare (Bugental, 2000; Bugental & Grusec, 2006; Grusec & Davidov, 2010). While the concept of attachment contains many key components, attachment was viewed in terms of the secure base function of attachment relationships. Data pertaining to the secure base were coded as ‘attachment’. Children who experienced a strong attachment with a caregiver consider that caregiver as a ‘secure base’ from which to venture and explore their surroundings (Ainsworth & Bell, 1970; Bowlby, 1988). Hierarchical relationships refer to the caregivers’ control over resources to encourage submission and obedience from the child (Grusec & Davidov, 2010). Social identity relationships are ones which involve belonging to a group with a shared identity, rules, and customs (Grusec & Davidov, 2010). Reciprocal relationships refer to interactions with caregivers which involve a mutual exchange of benefits has a positive effect on emotions (Grusec & Davidov, 2010). For caregivers, reciprocal relationships involved satisfying a child’s reasonable request to ensure future compliance from the child. For peers, reciprocal relationships involved engaging in activities which are mutually satisfying.

2.2.3 Findings of Literature Review 1

For data dealing with the socialization influence, the majority of data involving parents/caregivers represented the hierarchical relationship (57%), and the majority of data involving
peers represented the reciprocal relationship (65%) (see Table 2-1; Appendix 1.4). The literature suggested that the main influence of parents over a child’s engagement with nature happened within the hierarchical relationship and the main influence of peers happened within the reciprocal relationship.

The literature suggested that the main influence of parents over a child’s engagement with nature happened within the hierarchical relationship and the main influence of peers happened within the reciprocal relationship.

Table 2-1: Tally of occurrences of examples of social domain relationships involving CAREGIVER and PEER influence on engagement with nature

<table>
<thead>
<tr>
<th>Article</th>
<th>Occurrences of Social Domain Relationships (CAREGIVERS)</th>
<th>Occurrences of Social Domain Relationships (PEERS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attachment</td>
<td>Hierarchical</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Totals</td>
<td>9</td>
<td>33</td>
</tr>
<tr>
<td>Percentages</td>
<td>16%</td>
<td>57%</td>
</tr>
</tbody>
</table>

2.2.3.1 Attachment Relationships

Data which addressed the influence of attachment relationships with engagement with nature only involved caregivers and not peers. Given that attachment involved the relationship between a caregiver, typically an adult, and a child, it follows that data related to attachment will only involve caregivers.

Data consisted of researcher conclusions and participant quotes. From the data, the secure base function of attachment relationships emerged as a main theme (see Figure 2-1). For example, the secure base theme was identified from data coded as either scaffolding or autonomy. Vadala et
al. (2007) recognized that “parents appear to play a significant although indirect role in experientially preparing their children to benefit from structured environmental education through unstructured, self-directed experiences in nature” (p. 15). This conclusion was coded as scaffolding. Then Bixler et al. (2011) identified home range as an opportunity for environmental socialization by observing that parents allowed children to explore. This observation was coded as autonomy. Scaffolding opportunities and age-appropriate autonomy are variables within the secure base function of attachment relationships. Products of strong attachment included the caregiver as a secure base of exploration (Ainsworth and Bell, 1970; Bowlby, 1988) and an improved reaction to stress in that the child was more resilient to stress, better able to cope with stress, and adjust behavior to appropriately respond to stress better (Mikulincer & Florian, 1998; Repetti, Taylor, & Seeman, 2002).

Most of the data referenced the secure base function of the attachment relationship. Caregivers to whom a child is securely attached become a secure base from which the child explores and returns to find physical and emotional support (Bowlby, 1988). Inherent in secure base relationships is the importance of autonomy. In secure attachment relationships, caregivers encourage children to become more autonomous with age (Howe, Brandon, Hinings, & Schofield, 1999). The concept of a home range may be an outcome of the autonomy granted within secure attachment relationships and may be a manifestation of the secure base for children in middle childhood and adolescence. In a home range, caregivers set limits and boundaries on a child’s range of autonomous movement; however the child was free to explore without the direction of adults (Bixler et al., 2011; James et al., 2010; Vadala et al., 2007). In essence, the home became a secure base from which children in middle childhood and adolescence ventured to explore. Home range boundaries were defined in everyday life and at vacation destinations (Bixler et al., 2011; James et al., 2010; Vadala et al., 2007). One participant recalled, “The older we got, the further we could go, as long as there were check-in periods. You just know when you’ve gone too far” (Vadala et al., 2007, p. 7). Home range was scaffolded; the range was smaller for younger children and increased with age. “When I was young, I was restricted to within their sight, but sometimes I would wander off by myself and wander off into the woods. As I got older, I really didn’t have any restrictions” (Bixler et al., 2011, p. 43).
Autonomy is implied in the secure base for adolescents. Unlike a toddler who uses a caregiver as a secure base of exploration, caregivers and other adults were not present in the accounts retold by the participants in the Bixler, James, and Vadala series of articles. One participant recalled, "Mother kicked us outside in the morning and we weren't allowed to come back until night" (Vadala et al., 2007, p. 6).

2.2.3.2 Hierarchical Relationships

The majority of the data (57%) illuminating the caregiver's influence of a child's engagement with nature were typified by hierarchical relationships (see Table 2-1). Four themes emerged from the literature: change over time, opportunity, time spent, and rejection of control (see Figure 2-2).

Skar and Krogh (2009) documented the change of a child's engagement with nature in a study of Norwegians (N = 20; 18-72 years old). Participants who were children from 1945-1960 remembered having many outdoor chores, in addition to playing. Playmates came from the immediate neighborhood, so parents did not drive children to meet friends. Also, play was self-
directed; no adults were present. Participants who were children from 1960-1980 reported fewer outdoor chores and more time spent in outdoor play engaged with nature. Play was self-directed with no adults present and children experienced a home range which increased with age. In the study, parents of children who were currently between ages 5-11 years old described their child’s experience in very different ways. Home range was not a variable in the lives of their children since transport was provided exclusively by parents. In fact, contemporary parents were very present in their child’s lives. Participants reported spending substantial amounts of time supervising children. Where previous generations had a home range which expanded with age and freedom from adults, the children of the research participants did not have the same experience (Skar & Krogh, 2009). In reviewing these accounts, the influence of the hierarchical relationship between caregiver and child changed over time. Hierarchical relationships refer to the caregivers’ control over resources to

![Diagram](https://via.placeholder.com/150)

*Figure 2-2: Basic themes pertinent to hierarchical relationships.*
encourage submission and obedience from the child (Grusec & Davidov, 2010). Implicit in the hierarchical relationship is the caregiver monitoring of a child’s activities (Grusec, 2011). In the narrative from Skar and Krogh (2009), examples of parental monitoring greatly increased from 1945 until now which limited a child’s autonomy in the Netherlands. This trend of increase in parental supervision seems to be universal. In 1975, U.K. parents spent an average of 25 minutes a day supervising children. In 2000, the average jumped to 99 minutes. Parental time spent in supervising children almost quadrupled in 25 years (Gill, 2007). Trends in the United States parallel this trend in the United Kingdom. Gaster (1991) documented the change in autonomy of children living in Inwood, a neighborhood in New York City, from 1915 until 1976. Participants in the earliest generation were allowed to venture the city alone at the mean age of 5.50 year. Participants in the latest generation were allowed to venture the city alone at the mean age of 7.55 years (Gaster, 1991). In the 61 year span of the participants ages, the mean age of a child venturing out alone rose by 2.05 years. The range of the Gaster (1991) study ended in 1976. Looking at data from around the world, a reasonable conclusion is the mean age of autonomous exploration in the United States continues to increase.

Caregivers controlled a child’s opportunity to engage with nature in myriad ways. They elected to live near nature allowing children to experience nearby nature (Bixler & Morris, 2000; Bixler et al., 2011; James et al., 2010; Vadala et al., 2007). Living near nature was not an option for a participant in the Karsten and van Vliet (2006) study. A mother living in Amsterdam, the Netherlands lamented over her choice of living conditions. “I grew up in a village near the forest. That was terrific! I went to school alone, from my sixth [year] on, but my son cannot go anywhere ’til his twelfth” (Karsten & van Vliet, 2006, p. 154). To rectify her children’s limited access to nature, she bought vacant land outside of Amsterdam in which the family frequented to play in the natural environment (Karsten & van Vliet, 2006). Caregivers also chose vacation destinations (Bixler & Morris, 2000; Farmer et al., 2011; Vadala et al., 2007) and child care programs (Rice & Torquati, 2013) which may or may not involve natural environments. They tolerated outdoor play to some extent by allowing children to come home muddy, permitting the collection of natural objects, and providing opportunities to play in nature (Bixler & Morris, 2000; Bixler et al., 2011; James et al., 2010; Vadala et al., 2007). “Our sisters and I were allowed to explore or whatever and come back muddy or, you know picking up frogs or
asking my mom to save all the mayonnaise jars for like, you know, little fireflies or things like that” (Vadala et al., 2007, p. 7).

In hierarchical relationships, caregivers controlled how children spend time in nature by assigning outdoor chores, such as weeding planting beds and chopping wood (Bixler et al., 2011) and controlling participation in structured activities (Skar and Krogh, 2009). Even if adult-controlled activities occurred in a natural environment, location did not ensure a positive experience. James et al. (2010) described a participant forced to engage with nature under the regimented control of their father which cultivated an intense dislike of the outdoor environment in adulthood. Vadala et al. (2007) also described a participant who was forced to go to state parks by their father. He also regimented the experience by reading every sign. “My father—he would always make us go to all these state parks and he’d read every single sign—we were bored to tears” (Vadala et al., 2007, p. 13). These adult-controlled experiences negatively influenced the participants’ view of engagement with nature. Unlike the attachment relationship experiences where engagement with nature mimicked a secure base and autonomy was eventually granted through scaffolding, engaging with nature through regimented or overly controlled hierarchical relationships seemed to produce the opposite result. Without autonomy, caregiver influence over a child’s engagement with nature within hierarchical relationships may negatively influence the child’s engagement with nature in adulthood.

Control was the cornerstone of hierarchical relationships; however with control, came the potential for rejection of the control. In the literature, nature was portrayed as a refuge, a place to get away from caregivers and spend time with friends (Vadala et al., 2007), and the opportunity to create your own space. In investigating why certain playgrounds were visited, Jansson (2008) posited that lack of use may be attributed to adult control of playground design. Children may recognize that playgrounds were designed by adults instead of children which may account for lack of use. “In playgrounds where variation and opportunities for fun activities had taken a back seat to safety and tidiness, children reacted negatively. Boring, predictable playgrounds lead to frustration and low use” (Jansson, 2008, p. 103). The design of the physical environment may provide an antidote for these boring adult-controlled playgrounds. Jansson (2008) found that natural areas adjacent to playgrounds created opportunities for den construction and imaginative play. These adjacent natural areas
afforded the opportunity for children to create their own space which may diminish the boring aspects of playgrounds designed by adults. However, nature may not be the only contributing factor. Jansson (2010) interviewed visitors of 22 playgrounds in Sweden and determined that the most interesting playgrounds featured equipment unlike any other nearby playground and the most visited playgrounds were surrounded by wild natural areas.

2.2.3.3 Social Identity Relationships

Examples of social identity relationships from the literature contained both caregivers and peers. Caregivers utilized social identity relationships with children to impart a value system on being in nature and to provide scaffolding opportunities to engage with nature; peers utilized social identity relationships to distinguish themselves among peers and to find friends (see Figure 2-3).

Caregivers in the literature placed value on their children playing in a natural environment because they played in natural environments as children (Bixler et al., 2011; Cheng & Monroe, 2012; Hordyk, Hanley, & Richard, 2015). They demonstrated the value they placed on engagement with nature by allowing children to get dirty without negative consequences (Bixler et al., 2011, Vadala et al., 2007), saving jars for children to collect insects and wildlife (Vadala et al., 2007), fostering an interest in the natural world (Bixler et al., 2011), and by modeling good stewardship of the earth (James et al., 2010). A participant in the Bixler and Morris (2000) study recalled that their parents fostered tolerance of inclement weather.

“My parents, they’re very outdoorsy people. We’ve always done things outdoors. It’s like my parents’ philosophy, rain or shine. Tomorrow will be a better day, you wait and see and if it is still raining, but we always had fun and that was never a factor” (Bixler & Morris, 2000, p. 61).
The value the parents placed on engagement with nature was worth the risk of getting wet. However, Evans et al. (2007) found no correlation between the environmental attitudes of parents to the attitudes and behavior of children. Evans et al. (2007) contributed the lack of correlation to the age of the participants (mean age = 6.8) in that as children age and mature, their attitudes and behaviors may be more reflective of the parents.

Caregivers provided scaffolding opportunities in nature. Scaffolding refers to offering children age-appropriate tasks which exceed their current ability level where peers and/or parents assist the child in problem-solving situations (Bernier, Carlson, & Whipple, 2010). Caregivers scaffolded children’s engagement with nature by teaching how to distinguish ripe berries from unripe berries and how to fish (Chawla, 2007). The result of the scaffolding experiences may be autonomy. The more scaffolding experiences children had in nature may lead to more autonomous experiences in nature. Participants in Vadala et al. (2007) recognized caregivers as granting them the freedom as children to explore and play in nature without excessive supervision.
The ways in which children engaged with nature distinguished themselves from other peers and assisted in finding friends within social identity relationships. A participant in the Bixler et al. (2011) study recalled engaging with nature with a group of peers to scare girls as a way to distinguish themselves.

“Yeah it was kind of fun chasing girls with [a snake]—all of them except one girl. We thought she was scared of them too until we got to chasing her one day and she already had a snake in her hand, so we didn’t mess with her anymore” (Bixler et al., 2011, p. 50).

A participant in Vadala et al. (2007) used engagement with nature to distinguish herself among peers. “I always kind of had more of a tomboy as far as…playing monkey tag up in the trees, climbing trees, stuff like that. I probably always did more boy things than anything growing up” (Vadala et al., 2007, p. 8). The use of social identity relationships as a way to distinguish may transcend gender. Perhaps engaging with nature developed skills which children who did not engage with nature did not possess. “I’m different in that I see that much more. Driving down the road, what I see is much different from what other people see. My sister would drive home and not see a thing” (Bixler et al., 2011, p. 52).

Engagement with nature afforded the opportunity to find friends by connecting with like-minded people (Bixler et al., 2011). The natural environment afforded the opportunity for like-minded children to manipulate the environment through self-directed, unstructured play, such as fort building, exploration, and imaginative play, without the presence of adults (James et al., 2010).

“We did build forts. We had the same group of guys, so I remember we had bases set up at some point, you know, different points throughout the woods. And there were natural forts. We’d just gather sticks together and play behind them” (Vadala et al., 2007, p. 11).

Different ways in which to engage with nature facilitated in finding friends. “They were probably more interested in the war aspect. I liked the exploring better. One of my better friends who went into biology later in life too, we probably spent the most time together exploring” (Vadala et al., 2007, p. 7).

Reciprocal Relationships

The majority of the data (65%) illuminating the influence of peer-peer interactions over a child’s engagement with nature were typified by reciprocal relationships (see Table 2-1). In examples
of reciprocal relationships in the literature, peers acted as leaders and facilitators in regards to influencing peers to engage with nature; caregivers granted reasonable requests (see Figure 2-4). Only one instance of a reciprocal relationship was found for caregiver-child in the literature review. A participant reported requesting their caregivers to purchase a fish tank (Bixler et al., 2011). The caregivers complied and continued to upgrade the size of the tank as the child aged and matured. In caregiver-child interactions, reciprocity happened when a caregiver cooperated with a child’s reasonable request and the child was in turn cooperative to the caregiver’s future request (Grusec & Davidov, 2010).

![Figure 2-4: Basic themes pertinent to reciprocal relationships.](image)

Reciprocal relationships are defined by a mutual exchange of benefits and the resulting positive effect on emotions (Grusec & Davidov, 2010). The influence of peer-peer reciprocal relationships on engagement with nature was typified by children acting as leaders leading other children to engage with nature and children acting as facilitators facilitating engagement with nature.
Peers acted as leaders by creating opportunities to engage with nature. Peers who were granted the opportunity to engage with nature either through attachment or hierarchical relationships with caregivers provided opportunities to engage with nature for their peers (Bixler et al., 2011; Bixler & Morris, 2000). This leadership role happened beyond peers of similar ages. Older peers were reported to escort younger children to these opportunities (Jansson, 2008).

Peers facilitated the mutual exchange of benefits, which were engaging with nature in this case. Peers facilitated the exploration of the natural environment (Bixler & Morris, 2000; James et al., 2010; Vadala et al., 2007). Peers facilitated an interest in the natural environment (Bixler et al., 2011; Guiney & Oberhauser, 2009). Peers facilitated the choice of play location, which may be in nature (Jansson, 2008).

2.2.4 Limitations of Literature Review 2

The literature review investigating the influence of socialization on engagement with nature had two main limitations. First, three of the 15 articles shared a data set: Vadala et al. (2007), James et al. (2010), and Bixler et al. (2011); however each article had a different research objective. Vadala et al. (2007) included additional research participants (n = 10) who represented a contrast group or people who did not seek opportunities to engage with nature. The James et al. (2010) article focused on the experiences of participants during emerging adulthood (ages 19-35). The Bixler et al. (2011) article focused on identifying ways in which naturalists encourage young people to become interested in nature.

Unfortunately, the series of articles comprised the majority of the data (see Table 2-2). For articles involving caregiver-child relationships, the Bixler, James, and Vadala articles accounted for 89% of the data involving attachment, 45% of the data involving hierarchical, and 60% of the data involving social identity. For articles involving peer-peer relationships, the series accounted for 100% of the data involving social identity and 65% of the data involving reciprocal. While drawing conclusions from 15 articles is difficult, the situation was exacerbated by the fact that the majority of the data came from three articles.

A second limitation of the literature review was that the majority of the articles utilized qualitative research methods and data. Qualitative methods build theory; quantitative methods
generalize to a larger population (Creswell, 2009). Future research should focus on quantifying the assertions of the qualitative data.

Table 2-2: Data totals from the Bixler, James, and Vadala series of articles.

<table>
<thead>
<tr>
<th>Article</th>
<th>Occurrences of Social Domain Relationships (CAREGIVERS)</th>
<th>Occurrences of Social Domain Relationships (PEERS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attachment</td>
<td>Hierarchical</td>
</tr>
<tr>
<td>Bixler et al., 2011</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>James et al., 2010</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Vadala et al., 2007*</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td><strong>8</strong></td>
<td><strong>15</strong></td>
</tr>
<tr>
<td>Total responses from all articles:</td>
<td>9</td>
<td>33</td>
</tr>
<tr>
<td><strong>Percentages:</strong></td>
<td>89%</td>
<td>45%</td>
</tr>
</tbody>
</table>

*Includes the addition of (10) participants comprising a contrast group.

2.2.5 Summary of Literature Review 1

Through a literature review which produced 15 articles, themes emerged which illuminate the influence of socialization, as seen through the four domains of social life, on engagement with nature. Through attachment relationships, caregivers influenced engagement with nature through providing a secure base and building a capacity for resilience in children. Through hierarchical relationships, caregivers controlled resources to ensure compliance through providing opportunities and deciding how children spend their time. In the literature, hierarchical relationships changed over time with contemporary caregivers exercising more control over a child’s time. Also, a child’s rejection of caregiver control was evident. Through social identity relationships, caregivers valued engagement with nature and scaffolded opportunities to foster autonomy in nature; peers used engagement with nature to distinguish themselves among peers and find friends. Through reciprocal relationships, caregivers satisfied a child’s reasonable request to ensure compliance with future demands; peers led other peers to nature and facilitated engagement with nature.
2.3 Literature Review 2: The Influence of Nature on Socialization

Positive social interaction is critical for healthy socialization (Grusec & Davidov, 2010); therefore, socialization was operationalized as social interaction for this section of the literature review. Researchers credit a link between the natural environments and positive social interaction among children (Bixler, Floyd, & Hammutt, 2002; Munroe, 2013); however few studies empirically documented the effect of the presence of nature in the physical environment on the character of social interaction among children.

2.3.1 Literature Review Protocol of Literature Review 2

For the second review examining the influence of nature in the physical environment on socialization, no additional protocols were included beyond the protocols outlined in Section 2.1. Searches utilized combinations of the following key terms: social play, natural environment, and children. Selected articles provided details concerning the influence of social interaction/socialization on engagement with nature, particularly child-nature play. The greatest source of data came from articles investigating environmental socialization. These articles typically involved details of childhood memories of adults engaged in some environmental pursuit either as recreation or career. The data were mostly qualitative and included reflections of childhood pastimes which contributed to their environmental pursuits in adulthood. The search produced 14 articles.

2.3.2 Coding Protocol of Literature Review 2

Data from the 14 articles related to the influence of nature on social interaction among children were combined with similar data. A group of data addressed that nature fosters positive social interaction but offered no explanation for the correlation and was labeled “fosters positive social interaction”. Five themes emerged from the remaining data: affords social and cooperative play, supports autonomy, affords opportunity, creates social ties, and reduces aggression (see Table 2-3; Appendix 1.5).
Table 2-3: Articles and the corresponding themes regarding the influence of nature on social interaction

<table>
<thead>
<tr>
<th>Article</th>
<th>n</th>
<th>Country</th>
<th>Participants</th>
<th>Mean Age or Range</th>
<th>Method</th>
<th>Fosters Positive SI</th>
<th>Affords SP / CP</th>
<th>Supports Autonomy</th>
<th>Affords Opportunity</th>
<th>Social Ties</th>
<th>Reduces Aggression</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cann et al., 2013</td>
<td>36</td>
<td>Italy</td>
<td>Preschool students</td>
<td>5-12</td>
<td>Observation</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2. Chawla et al., 2014</td>
<td>169</td>
<td>US</td>
<td>(2) elementary schools (4) high schools Students, teachers, parents, alumni</td>
<td>Various</td>
<td>Observation (children) Interview</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3. Dutt, 2012</td>
<td>42</td>
<td>Canada</td>
<td>Elementary school students</td>
<td>Unknown</td>
<td>Interview</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4. Fjorlaff, 2004</td>
<td>75</td>
<td>Norway</td>
<td>Kindergarten class</td>
<td>5-7</td>
<td>Observation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Hordy, Stanley, &amp; Richard, 2015</td>
<td>25</td>
<td>Canada</td>
<td>Immigrant families enrolled in a welcome class through school</td>
<td>7-15</td>
<td>Interview</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6. Jansson, 2008</td>
<td>141</td>
<td>Sweden</td>
<td>Children from (3) Swedish communities</td>
<td>6-11</td>
<td>Interview</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Kuo &amp; Sullivan, 2001</td>
<td>545</td>
<td>US</td>
<td>Public housing residents</td>
<td>34</td>
<td>Interview</td>
<td>Greenness scale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Lindemann-Matthies &amp; Knecht, 2011</td>
<td>257</td>
<td>Switzerland</td>
<td>Elementary school teachers</td>
<td>43</td>
<td>Interview, observation, and questionnaire</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Malone &amp; Truter, 2003</td>
<td>50</td>
<td>Canada</td>
<td>Elementary school</td>
<td>8-10</td>
<td>Interview</td>
<td>Behavior mapping</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. O’Brian &amp; Murray, 2007</td>
<td>24</td>
<td>Britain</td>
<td>Forest schools</td>
<td>3.2-9</td>
<td>Observation</td>
<td>Interview</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Owens &amp; Kinne, 2009</td>
<td>58</td>
<td>US</td>
<td>Youth serving collaborative</td>
<td>5-20</td>
<td>Photo voice</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Sollod, Dobandorfer, &amp; Hamsian, 2007</td>
<td>461</td>
<td>Switzerland</td>
<td>Swiss and foreign pupils (417) Teachers (24)</td>
<td>13.3</td>
<td>Interview</td>
<td>Questionnaire</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>14. Sullivan, Kuo, &amp; DeFoster, 2004</td>
<td>758*</td>
<td>US</td>
<td>Public housing residents</td>
<td>n/a</td>
<td>Observation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Sullivan et al., 2004 used 758 observations, not participants

Notes: SI = social interaction, SP = social play, and CP = cooperative play

2.3.3 Findings of Literature Review 2

Through observations, interviews, and questionnaires, research supports that nature positively influences social interaction, particularly in school settings around the world. Chawla, Keena, Pevec, and Stanley (2014) observed that the natural areas of the two elementary schools and four high schools in the US supported the development of social relationships. In interviews, Dutt (2012) noticed that children frequently mentioned the presence of friends in natural settings on the grounds of an elementary school in Canada, thus supporting the positive influence of nature on social interaction. Teachers concurred with this assessment. The majority of teachers in Switzerland who participated in interviews in a study conducted by Lindemann-Matthies and Knecht (2011) perceived
that students were “more focused, social, and open when in a forest” compared to a traditional classroom (p. 159). Nature outside of school settings seemed to foster positive social interaction. Seeland, Dubendorfer, and Hannsmann (2009) interviewed elementary school students in Switzerland and discovered that participants identified outdoor settings, such as parks and areas near lakes, as the most conducive place, besides school, to make friends. Also, living in close proximity to nature (within 1 km and 3 km of green space) in the Netherlands was associated with fewer feelings of loneliness for children; living within 1 km of green space was associated with experiencing less of a shortage of social support for children (Maas, van Dillen, Verheij, & Groenewegen, 2009). These findings may be attributed to the positive influence of nature on social interaction.

None of these articles examined why the association exists. The remaining data of the literature review were sorted into five themes addressing possible explanations for the association: affords social and cooperative play, supports autonomy, affords opportunity, creates social ties, and reduces aggression (see Figure 2-5).

![Figure 2-5](image)

*Figure 2-5: Basic themes pertinent to the role of nature in fostering positive social interaction.*
2.3.3.1 Affords Social and Cooperative Play

One reason nature may foster social interaction among children was the affordance of social and cooperative play. The natural environment afforded a multitude of play options (Fjørtoft, 2004) suitable for small groups (Carrus et al., 2012; Malone & Tranter, 2003), such as exploring, loose parts play, and construction with natural elements (Malone & Tranter, 2003). These play options were divided into social play and cooperative play. Social play involves children playing together, such as playing house, and cooperative play involves children working together to accomplish a common task/goal, such as den construction.

For social play, Carrus et al. (2012) observed that nature in the outdoor environment better supported social interaction of preschoolers in Italy than the interior classroom due to the increased prevalence of small group play. The forest area at an elementary school in Canada was also found to support small group play better than non-natural areas of the schoolyard (Malone & Tranter, 2003).

For cooperative play, den and fort construction was a reoccurring activity which supported social interaction. Adults in the US identified the forest as a necessary setting for the development of social skills for children due to the cooperative nature of fort building (Chawla et al., 2014). The positive relationship between den/fort construction and the development of social skills was shown in studies of elementary students in Canada (Dutt, 2012) and Sweden (Jansson, 2008). However, cooperative play in a natural environment is more than just den/fort construction. Cooperative play is about working together to accomplish a common task. The natural environment seems to support activities, such as cooperative play, which fosters social interaction. Teachers in forest schools in the UK perceived that the cooperative nature of play in a natural environment fostered positive social interaction through “the development of language and communication skills” (O’Brien & Murray, 2007, p. 254). The findings seemed to apply to older children as well. For teenagers and young adults in the US, the natural environment afforded activities, such as “playing in the water, walking a dog, or enjoying the scenery”, which facilitated positive social interactions (Owens & McKinnon, 2009, p. 53).

2.3.3.2 Supports Autonomy

Playing in a natural environment may facilitate autonomy by supporting the absence of caregivers and fostering positive social interaction among peers. From interviews with 437 native and
international students in primary and secondary schools in Switzerland, Seeland, Dubendorfer, and Hansmann (2009) found that as children aged, they were accompanied by adults to the forest less than younger peers. Dutt (2012) citing Erikson, a child development expert, credited autonomy, i.e., the absence of caregivers, as an important stage of development in middle childhood and adolescence. “For children at this stage in their development, establishing a self that is separate from adult control (Erikson 1968) is a meaningful activity and is written about extensively in the children and nature literature” (Dutt, 2012, p. 212). Dutt (2012) found during interviews with Canadian elementary students ($N = 42$) that natural spaces, particularly a wooded area on school grounds, supported positive social interaction by affording the creation of a world separate from adults. The affordance of autonomy may also apply to younger children. In the Carrus et al. (2012) investigation of 16 preschoolers in Italy, researchers observed that teachers intervened less when children were outdoors when compared to indoors which may be attributed to the children displaying boredom less in the outdoor space.

2.3.3.3 Affords an Opportunity for Social Interaction

A natural environment may afford the opportunity for social interaction. Hordyk, Hanley, and Richard (2015) found that immigrant families ($N = 23$) living in Montreal, Canada identified urban parks as affording an opportunity to strengthen family bonds and to interact with other families. Sullivan, Kuo, and DePooter (2004) found similar results in the US. When comparing green spaces (tree-filled spaces) to barren spaces (no trees) surrounding public housing in Chicago, Ill., Sullivan et al. (2004) found that green spaces contained 90% more people than barren spaces and 83% more people were engaged in social interaction in green spaces than barren spaces. The mere presence of nature may afford increased opportunity for social interaction.

2.3.3.4 Creates Social Ties

A natural environment may facilitate the creation of social ties by facilitating membership. In the Hordyk et al. (2015) study of immigrant families in Canada, nature was illuminated as a medium in which to create social ties. An eight year old female participant described nature as a way to continue social ties to friends and family members from whom she was separated.
“Nature always stays in her place…but gives us the courage to travel and move because she knows she will always be there. Your family and friends go to other countries where they will go and stay forever. The trees and leaves will always be at their side” (Hordyk et al., 2015, p. 77).

While her world was changing and she was separated from her family and friends, nature was ever-present which comforted the participant. The participant coped with the separation from loved ones through engagement with nature and the shared engagement with nature of her loved ones. The comfort she received from nature may have eased the pain of separation from family and friends. The mutual connection to nature may have made the separation easier to bear. Hordyk et al. (2015) also found that engagement with a natural environment may facilitate membership into a new culture for immigrant families. Participants expressed pride and feelings of belonging from participating in culturally relevant physical activities that incorporated a degree of difficulty, such as sledding, ice skating, and climbing.

2.3.3.5 Reduces Aggression

The natural environment may influence the quality of social interaction by reducing aggression. Kuo and Sullivan (2001) studied public housing units in Chicago, Ill. Environmental assessments determined the level of greenness for the grounds surrounding the units either as green (trees) or barren (no trees). Kuo and Sullivan (2001) found that caregivers who lived in buildings adjacent to green areas were less likely to employ psychologically aggressive tactics, such as insulting, threatening, or destroying property out of anger, toward children over an extended period of time. Exposure to nearby nature seemed to facilitate positive social interaction between caregiver and child. The effect was mediated through restoration from mental fatigue. Residents with nearby nature displayed higher levels of attention as assessed by digit span backwards tests and aggression was found to be negatively related to attention (Kuo & Sullivan, 2001). Kuo and Sullivan (2001) concluded that reduced mental fatigue resulted in a better display of attention and consequently less aggression for residents with nearby nature.
2.3.4 Summary of Literature Review 2

This portion of the literature review investigated the influence of the natural environment on socialization which was operationalized as social interaction. Within the 14 articles which the review produced, evidence suggested that the natural environment fostered positive social interaction in 5 ways: affording social and cooperative play, supporting autonomy, affording opportunity to interact, creating social ties, and reducing aggression. A natural environment supported multiple opportunities for social and cooperative play by facilitating small group play and den/fort construction. Playing in a natural environment may facilitate autonomy by supporting the absence of caregivers and fostering positive social interaction among peers. A natural environment may afford the opportunity for social interaction in that research suggested that people congregate in green areas. A natural environment may facilitate the creation of social ties by facilitating resilience and membership through risk taking activities. Lastly, the natural environment may influence the quality of social interaction by reducing aggression.

2.4 Literature Review 1 and 2 Summary

Two literature reviews were conducted. The first literature review investigated the influence of socialization on engagement with nature, produced 15 articles, and found that caregivers most influenced engagement with nature through hierarchical relationships and peers through reciprocal relationships. Hierarchical relationships changed over time with contemporary caregivers exercising more control over a child’s time. Through reciprocal relationships, peers led other peers to nature and facilitated engagement with nature. A limitation of this portion of the literature review was that the majority of the findings came from three articles which utilized the same data set.

The second literature review focused on the influence of the natural environment on socialization, operationalized as social interaction. This review produced 14 articles. Research suggested that nature fostered positive social interaction by affording social and cooperative play, supporting autonomy, affording opportunity to interact, creating social ties, and reducing aggression.

Since none of the reviews produced many articles, conclusions are difficult. More research is needed for definitive conclusions. However, the available literature, although limited in number, suggests that a bidirectional relationship between nature and socialization exists.
2.5 Research Questions

The research questions were crafted to explore the bidirectional relationship between the physical environment (nature) and the social environment (socialization) since evidence of the relationship in the existing literature is limited in number and inconclusive. Also, the theoretical perspective, probabilistic epigenesis, suggests the possibility of an effect of a bidirectional relationship between the physical environment (nature) and social environment (socialization) on behavior. The questions were aimed at the study cohort: the caregivers and children who played in Cemetery Branch between 2002 and 2006.

The first question explored the first direction, socialization → nature. The second question explored the second direction, nature → socialization (operationalized as social interaction). Since the researcher is a registered landscape architect, the third question explored the characteristics of the physical environment (location, physical characteristics, and temporal considerations) which may affect the bidirectional relationship.

- Question 1: How did socialization influence the engagement with nature of the study cohort playing in Cemetery Branch between 2002 and 2006?
- Question 2: How did nature influence social interaction of the study cohort playing in Cemetery Branch between 2002 and 2006?
- Question 3: How did the physical environment influence the bidirectional relationship of the study cohort playing in Cemetery Branch between 2002 and 2006?
Chapter 3: Research Methods

3.0 Introduction

As seen in the literature reviews, evidence existed of a bidirectional relationship between socialization and nature; however conclusions were difficult from so few articles found in the literature review. Through a grounded theory investigation of the creek play of the study cohort during 2002-2006 in the portion of Cemetery Branch across from Conn ES in Raleigh, NC, the dissertation research continued to investigate the bidirectional relationship.

3.1 Grounded Theory

Grounded theory refers to a research methodology which builds theory from qualitative data that is collected and analyzed systematically (Strauss & Corbin, 1994). In other words, the theory is grounded in the data. The original research interest was to investigate the creek play behavior highlighted in the YouTube video. From casual observations of the contemporary children, the creek play behavior changed. Evidence of the tribal society did not exist. The YouTube video highlighted cooperative play, e.g., building a bridge to cross the creek and floating a raft; games with rules, e.g., capturing a flag tied to a stick and swinging a rope into a tree; and constructive play, e.g., creating art from found objects and making dens in existing shrubs. From casual observations of the current creek play, contemporary children did not display behavior consistent with the behavior demonstrated in the video. The behavior seemed to involve releasing the pent-up energy from the school day. The play seemed to be very physical. Also, parents were present supervising the creek play. Parents established and enforced the boundaries in which the play occurred. These casual observations were confirmed by the study cohort in interviews.

Through these casual observations, the significance of the creek play behavior displayed in the YouTube video became clear. Something was different about this time period of the creek play. Understanding this difference illuminated the bidirectional relationship between socialization and nature of the study cohort. The findings of the study were qualitative in nature providing a thick, rich description of the activity in an attempt to build theory instead of generalizing to a larger population (Denzin & Lincoln, 2005).
3.2 Operationalization of Socialization and Nature

Characteristics of socialization and nature were considered in examining the bidirectional relationship (refer to Figure 3-1). When exploring the first research question (How did socialization influence the engagement with nature of the study cohort playing in Cemetery Branch between 2002 and 2006?), socialization was described in terms of the four domains of social life: attachment, hierarchical, social identity, and reciprocal relationships, (Grusec & Davidov, 2010) as detailed in Chapter 2. When exploring the second research question (How did nature influence social interaction of the study cohort playing in Cemetery Branch between 2002 and 2006?), socialization was operationalized as social interaction. Socialization represents the impact of social interaction on development. The researcher assumed that the social interaction surrounding the creek would impact development.

For the third research question (How did the physical environment influence the bidirectional relationship of the study cohort playing in Cemetery Branch between 2002 and 2006?), the cohort during interviews described nature in terms of the location, physical characteristics, and temporal considerations. Location referred to qualities such as the proximity to the elementary school and the children’s homes. Physical characteristics referred to the presence of water and the wildness of the creek. Temporal considerations referred to the changes in the creek environment from the time the cohort played in the creek until 2014. The researcher adopted these dimensions (location, physical characteristics, and temporal considerations) in coding data regarding the influence of the physical environment.

3.3 Research Methods

Knowledge gained through causal observations and informal interviews defined the scope of the research. By understanding the variation in the creek play behavior among generations and the environmental influences which contributed to this variation, understanding of the bidirectional relationship between nature and socialization was gained.
The research questions sought to understand the bidirectional relationship between socialization and nature.

- Question 1: How did socialization influence the engagement with nature of the study cohort playing in Cemetery Branch between 2002 and 2006?
- Question 2: How did nature influence social interaction of the study cohort playing in Cemetery Branch between 2002 and 2006?
- Question 3: How did the physical environment influence the bidirectional relationship of the study cohort playing in Cemetery Branch between 2002 and 2006?
Multiple methods explored the research questions (see Table 3-1). The YouTube video analysis, interview, memo-writing, and physical environment description explored questions one and two. Interview, memo-writing, and the physical environment description are utilized to explore question three.

Table 3-1: Utilization of multiple methods to investigate the research questions.

<table>
<thead>
<tr>
<th></th>
<th>METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Video analysis</td>
</tr>
<tr>
<td>Question 1: socialization → nature</td>
<td>X</td>
</tr>
<tr>
<td>Question 2: nature → socialization</td>
<td>X</td>
</tr>
<tr>
<td>Question 3: physical environment</td>
<td>X</td>
</tr>
</tbody>
</table>

3.3.1 YouTube Video Analysis

The YouTube video (grebo58, 2012) was a collection of photographs taken by a parent over the course of her son and his friends playing in the creek. The photographs reflected memorable moments in lives of the cohort and were selected with care since some of the behavior depicted in the photographs coincided with the lyrics of The Who’s ‘Baba O’Riley’. For example, a photograph displaying a boy bent over digging in the ground with a stick appeared during the lyrics “I get my back into my living”. A limitation of utilizing the video for data was that real-time activity was not represented. The photographs do not necessarily represent the day-to-day experience of the creek play, instead, they represent the moments that are memorable to the parent who took the photographs. Another limitation was the duplication of photographs in the video. At least three photographs were repeated; the researcher did not eliminate these photographs from analysis.
The video served as a starting point in the grounded theory research in an attempt to understand the creek play activity of the study cohort. From casual observations of the contemporary children playing at the creek, the tribal society was no longer in existence and parents seemed to be more present today. The video analysis examined the bidirectional relationship between nature and socialization. The analysis utilized a prior coding system observing behaviors such as engagement with nature, social interaction with peers, and autonomy.

3.3.1.1 A Priori Coding

A priori coding refers to the analysis of data utilizing established codes (Creswell, 2007). Three behaviors were selected for the a priori codes: engagement with nature, social interaction with peers, and autonomy. Behaviors identified for coding related to the bidirectional relationship between nature and socialization. Nature was represented as the code ‘engagement with nature’ and socialization was represented as the code ‘social interaction with peers’. Social interaction with adults was not prevalent in the video. The influence of autonomy on the bidirectional relationship was established in the Literature Review and therefore added as a code.

3.3.1.2 Coding Procedure

Behavior was coded in five second increments based on three dimensions: engagement with nature, social interaction with peers, and autonomy (see Table 3-2). Each dimension was coded separately. Intervals were coded as depicting the dimension if three or more seconds of the five second interval displayed behavior associated with the dimension.

Behaviors involving any interaction with any natural elements or engagement with the natural environment were coded as ‘engagement with nature’. For example, children playing with sticks or floating a raft down the creek was coded as ‘engaging with nature’. The code ‘social interaction with peers’ was utilized when more than one child was present in a photo (the video was a photo montage) and they were interacting with one another. Photographs in which children were nearby but not interacting were not coded as ‘social interaction with peers’. Time periods with photographs where the absence of adults was obvious are coded as ‘autonomy’.
### Table 3-2: Behavior coding matrix of YouTube video analysis

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Coded</th>
<th>Not coded</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement with nature</td>
<td>Children utilizing a natural element as a play object, such as playing with sticks or floating on a homemade raft in the creek.</td>
<td>Children simply being outdoors and not utilizing natural elements as play objects.</td>
<td>If only one child within a group utilized a natural element as a play object for at least 3 out of the 5 second interval, then behavior was coded as engagement with nature.</td>
</tr>
<tr>
<td>Social interaction with peers</td>
<td>More than one child was present in the photograph, and they were interacting. For example, climbing trees or rough and tumble play.</td>
<td>Photos where only one child was present or a group of children did not appear to be interacting.</td>
<td>To be coded as social interaction with peers, children were interacting through touching, conversation, or a cooperative activity.</td>
</tr>
<tr>
<td>Autonomy</td>
<td>Adults were clearly absent.</td>
<td>Adults were clearly present.</td>
<td>If no adults were in the photos, then the age of the photographer must be known in order to code as ‘autonomy’.</td>
</tr>
</tbody>
</table>

#### 3.3.2 Semi-structured Interviews

Semi-structured interviews are formal interviews which employ an interview guide instead of rigid questions. Interview guides can be a list of questions or topics to cover during interviews. The researcher has the flexibility to allow the interview to proceed as a conversation; however the interview guide ensures that the participants provide the same level of information. The interview guide was created from preliminary casual observation and informal interviews.

#### 3.3.2.1 Interview Procedure

Interviews took place at the participants’ residences (n = 2), workplaces (n = 1), coffee shops (n = 1), or via Skype (n = 1). All interviews were audio recorded. Interview questions were created to ensure a consistent level of information gleaned from participants; however interviews evolved more like a conversation since a semi-structured interview format was employed. Threads of information were followed and at the end of the conversation, interview questions were reviewed and asked if not
covered. Figure 3-2 contains the interview questions for the children, and Figure 3-3 contains the questions for the caregivers.

3.3.2.2 A Priori Coding

Interview data were coded utilizing the Literature Review coding protocol. The Literature Review explored the bidirectional relationship between socialization and nature. The socialization influences which affect engagement with nature were organized around the four domains of social life (attachment, hierarchy, social identity, and reciprocal relationships) as defined by Grusec and Davidov (2010). Interview data which addressed how socialization influences engagement with nature were organized around the four domains of social life. In the Literature Review, data relating to the nature → socialization (social interaction) relationship were grouped with similar data and five themes were identified which explained how nature fosters positive social interaction: affords social and cooperative play, supports autonomy, affords an opportunity for social interaction, creates social ties, and reduces aggression. Interview data addressing the influence of nature on social interaction was coded utilizing the themes identified in the Literature Review. Literature Review and interview data were compared. Literature Review themes were refined, and new themes were identified.

3.3.3 Memo-writing

Memo-writing is a main technique within grounded theory research (Charmaz, 2006). Memo-writing involves the researcher journaling during the research effort. By collecting the ideas, connections, and comparisons which arise during research, memos provide researchers a forum which help to clarify research questions and define the direction for the current and future research (Charmaz, 2006).

For the dissertation research effort, the researcher mainly wrote memos during the coding of interview data. The main purpose of the memos was to connect data and define the path of the argument of the dissertation. Memos were axial coded or grouped into categories (Charmaz, 2006). These categories eventually clarified and focused the meaningful findings of the research.
• What are you doing now? In school, working?
• What are your plans for the future?
• Why did you play in the creek?
• Did you notice any barriers to you playing in nature?
• Did your parent encourage you to play in the creek or was it your idea?
• Did you play with the same children in the creek or did the group change?
• When you played in the creek, did your parent(s) supervise you? Did your parent(s) watch you, did a fellow parent watch you, or did you walk home independent of adult supervision?
• If you supervised, how did your parent monitor play in the creek? Did they correct behavior or did they allow situations to work out? If they corrected behavior, what type of behavior did they correct?
• Were you always allowed to play in nature?
• Why do you think you were allowed to play in the creek? In nature?
• Do you believe that this play experience benefited you in some way? Explain.
• How did the other parents feel about you playing in the creek? Were any very vocal for or against the activity?
• Other than the creek, where did you play?
• How many of these places would you classify as natural?
• Did you notice a difference in your parent’s level of supervision when you played in nature versus a traditional playground with swings and monkey bars?

Figure 3-2: Interview guide for the children in the study cohort.
- Why do you allow your child to play in the creek?
- Do you know how this activity (playing in the creek) started?
- Why do you think this activity (playing in the creek) occurs?
- Did you encouraged your child to play in the creek or was it their idea?
- What are the barriers to your children playing in nature?
- When your child is playing in the creek, how do you supervise them? Do you watch them, do you take turns with a fellow parent, or do you allow them to walk home independent of adult supervision?
- If you supervise, how do you monitor play in the creek? Do you correct behavior or do you allow situations to work out? If you correct behavior, what type of behavior are you correcting?
- Have you always allowed your child to play in nature?
- Why is it important that your child play in the creek? In nature?
- Do you believe that this play experience will benefit your child in some way? Explain.
- What is the general feeling of parents about the children playing in the creek? Are any very vocal for or against the activity?
- Other than the creek, where do your children play?
- How many of these places would you classify as natural?
- When your child plays, do you feel like you need to supervise them more when they play in a natural environment as opposed to a traditional playground with swings and monkey bars?
- What were your favorite play experiences as a child? Were these experiences in nature?
- Did you play in a natural environment?
- How did these play experiences impact your life?

Figure 3-3: Interview guide for the caregivers in the study cohort.
3.3.4 Physical Environment Description

From the interviews, three characteristics of the physical environment emerged which affected the bidirectional relationship: location, physical characteristics, and temporal considerations.

3.3.4.1 Location

The location of the creek was recognized as influencing the bidirectional relationship in the interviews. The creek environment was described utilizing interview data which referred to the location of the creek affecting the socialization → nature and the nature → socialization relationships. Data included proximity to the neighborhoods, the school, and the surrounding context, e.g., proximity to neighbors and downtown Raleigh. A physical environmental description investigating the influence of the location of the creek was guided by the interview data.

3.3.4.2 Physical Characteristics

Physical characteristics were mentioned during interviews which affected the bidirectional relationship, e.g., the presence of water and the open field. This piece of the description involved cataloging the physical characteristics which influenced the bidirectional relationship.

3.3.4.3 Temporal Considerations

The physical environment experienced changes over time which may have initiated changes in the bidirectional relationship. An analysis of aerial photographs over time, a comparison of the YouTube photographs with current site photographs, and clues from the interviews were compiled to account for the change in the bidirectional relationship.

3.4 Research Participant Recruitment

Research participants represented a purposeful sample; they previously played in Cemetery Branch or were parents of these children. One neighborhood insider, Donna, was identified and aided in recruiting participants. The neighborhood insider was the mother who created the YouTube video (grebo58, 2012). Potential participants were contacted either by phone or email. All participants live or lived in the Oakdale or Mordecai neighborhood. To establish the uniqueness of the creek play, the final set of participants selected had children who played in the creek before and after the cohort in
the YouTube video. No other participants were recruited since the data reached saturation. In grounded theory research, data saturation refers to the point where the data contributes no new information to the understanding of the activity (Creswell, 2007). After interviewing the three children of the study cohort, the data were saturated; the three interviews revealed the same basic information.

3.5 Research Participants

Participants were identified and recruited with the help of a neighborhood insider, Donna. Rose and Donna were the caregivers and Chris, David, and Matt were the children (see Figure 3-4). Names of research participants were changed and based on Doctor Who characters and actors. The research participants represented a timeline of the creek play experience. The experiences of Tom and Mickey documented the creek play before and after the study cohort, respectively. The experiences of Chris, David, and Matt represented the study cohort.

The cohort who played in the creek from 2002 until 2006 consisted of between six and seven boys consistently. Although a girl was featured in the YouTube video, boys consistently played in the creek and therefore, comprised the cohort.

3.5.1 Rose, Tom, and Chris

When Tom attended Conn ES, Rose was a stay-at-home mother with a newborn baby, Chris. Living within ½ mile of Conn ES, Rose walked to pick up Tom from school. Initially, Rose waited with other caregivers under a large oak tree on the Conn ES campus to retrieve the children. After the tree was removed, caregivers relocated across Brookside Dr. to the creek area since parking along Norris St. was convenient and a crossing guard ensured the safe crossing across Brookside Dr. of the children. On days when he was not in preschool, Chris accompanied Rose to the creek. By the time Chris started school at Conn, Rose started a business from home with flexible hours. Chris played in the creek with the study cohort until Rose picked him up after work which is usually between 5:00 pm and 6:00 pm or Chris walked home.
3.5.2 Donna, Matt, and Mickey

Donna created the YouTube video for a conference presentation. She assembled photographs of memorable times in the lives of her children in a video set to the Who’s ‘Baba O’Reilly’. She strongly believed that children should have autonomy.

“The weirdness in my mind is the worry and the overprotection, and I have always tried to be a voice for the other side. I see it hurting children when parents are overly protective, and they project their fears on the kids, and so the kids… absorb those fears and have a fearful attitude towards the world. I think that is sort of the abnormal behavior.”

This sentiment was reflected in the YouTube video where Donna presented the creek as the antithesis to the restrictive school environment.
“I just think the creek was a great anecdote to that because in the public school, they were just trying to keep control of the animals, and so it was nice that the animals were let loose and let to do what they wanted to do right after, and they loved it, too.”

Mickey, Matt’s younger brother, played in the creek with the study cohort, but did not continue the activity since there were no friends his age who were interested.

3.6 Qualitative Quality Standards

The objectives of quantitative and qualitative research approaches are different. A quantitative research approach seeks to generalize to a larger population; while qualitative research approach seeks to build theory (Creswell, 2007). The different objectives of the research approaches warrant the use of different quality standards (Groat & Wang, 2002). Therefore, only qualitative quality standards were considered in the research design.

3.6.1 Transferability: Thick Description

The term ‘thick description’ originated in 1949 with Gilbert Ryle, a British philosopher but Clifford Geertz in 1973 applied the term to the field of anthropology (Ponterotto, 2006). Providing a thick description in qualitative research means that the behavior under study was described and interpreted in a thorough way which activates a readers’ empathy. In other words, the description and interpretation were so complete or thick that the reader could easily imagine having the same experience as the research participants (Ponterotto, 2006). The findings resonate with readers.

Regarding quality standards, a thick description ensures transferability. Transferability is the qualitative equivalent of generalizability in quantitative research (Groat & Wang, 2002). In quantitative research, researchers generalize to a larger population through the use of statistical figures. In qualitative research, researchers transfer an account of participants’ emotion/experience/thoughts that resonates with the reader. The goal of the thick description is to stimulate thick interpretation which leads to thick meaning (Ponterotto, 2006). To be classified as ‘thick’, the description goes beyond simply reporting action or behavior of the research participants. The description must involve the accurate accounting of “thoughts, emotions, and web of social interaction among observed participants in their operating context” (Ponterotto, 2006, p. 542). In interpreting social actions, the
researcher constructs participant motivation and objectives for the social action in the thick description.

3.6.2 Credibility and Confirmability: Triangulation

In property surveying, triangulation refers to locating an unknown point or feature in the landscape by identifying multiple reference points. The surveyor measures and records the distance from the unknown point to the multiple known reference points. The use of multiple reference points ensures accuracy of the survey. In research, triangulation refers the use of multiple research methods or data in order to reduce the weaknesses and combine the strengths of research design in studying the behavior of interest (Groat & Wang, 2002; Janesick, 1994). There are five basic types of triangulation: data triangulation (multiple data sources), researcher triangulation (multiple researchers to evaluate data), theory triangulation (multiple theories to analyze data), methodological triangulation (multiple methods), and interdisciplinary triangulation (use of knowledge from multiple disciplines) (Janesick, 1994). The dissertation research utilized data, methodological, and interdisciplinary triangulation. The use of multiple data sources (photographs, personal accounts, research analysis, and researcher observations) achieved data triangulation. Utilization of video analysis, interview, memo-writing, and physical environment description achieved methodological triangulation. Synthesis of knowledge from psychology (developmental and environmental), park and recreation, and neuroscience achieved interdisciplinary triangulation.

Triangulation ensures two quality standards: credibility and confirmability. Credibility accounts for the complexity of naturalistic investigations by requiring a holistic approach to research (Groat & Wang, 2002). In other words, behavior is studied from different vantage points. By utilizing multiple methods and data sources to cross-check findings, which is at the heart of triangulation, credibility is achieved. Confirmability refers to the quality of data and findings being confirmed (Groat & Wang, 2002). In regards to triangulation, the confirmability of the research is ensured through the utilization of multiple methods and data sources.
3.6.3 Confirmability: Reflexivity

As stated before, confirmability refers to the quality of data and findings being confirmed (Groat & Wang, 2002). Reflexivity requires the researcher to state any bias which may influence any stage of the research (Groat & Wang, 2002). As stated in the Bio, the researcher approached the research effort with previous experience and knowledge of the benefits children receive from exposure to nature. While the cohort’s engagement with nature displayed in the YouTube video caught the attention of the researcher, the findings revealed the influence of variables other than the presence of nature in the physical environment. In acknowledging the potential bias toward nature in reflexivity, the findings supported confirmability since the influence of engagement with nature was not a major feature of the findings.
Chapter 4: Findings

4.0 Introduction

The research produced unexpected findings. As mentioned earlier, the researcher brought previous personal experience and knowledge regarding the benefits children receive from exposure to nature. The participants did not focus on the cohort’s engagement with nature during the interviews; instead the focus was the effect of the autonomy afforded. When Literature Review findings were compared to the research findings, autonomy was present in both.

4.1 YouTube Video Analysis

The YouTube video which lasted 5 minutes and 34 seconds (05:34) did not display live action; instead the video was a montage of photographs taken over the course of the cohort’s childhood. Two main limitations existed for using the video as a data set. First, the photographs may not represent the day-to-day activities, but instead represented moments that were memorable to the parent who photographed the creek play. Therefore, any findings from the video can only apply to behaviors displayed in the photographs and not to behaviors displayed throughout their childhood. Another limitation is that the video represented the creator’s partiality to children having autonomy. For example, the first 25 seconds of the video highlighted the boys at school and presented the school environment as restrictive, e.g., children walked on the third row of tiles in the hallway and sat criss-cross applesauce (sit on the floor with legs crossed in front). The mother who created the video recognized that the creek environment offers an antithesis of the restrictive school environment in that her children had freedom to choose their play activity.

For each behavior, the video produced 67 intervals in which to code behavior; 05:34 minutes divided into 5 second blocks resulted in 67 intervals. Therefore, 201 observations were made (67 intervals * 3 behaviors). The majority of the video displayed occurrences of social interaction with peers (67%; 03:45) or engagement with nature (81%; 04:30) (refer to Table 4-1). Additionally, the majority of the photographs in the video depicted occurrences of the cohort socially interacting with peers while engaging with nature (59.8%; 03:02), thus engaging with nature may facilitate positive social interaction (refer to Table 4-2).
Table 4-1: Time stamp analysis of the study cohort's activity in the YouTube video

<table>
<thead>
<tr>
<th>Time</th>
<th>Engagement with Nature</th>
<th>Social Interaction with Peers</th>
<th>Autonomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:00:05</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:00:10</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:00:15</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:00:20</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:00:25</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:00:30</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:00:35</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:00:40</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:00:45</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:00:50</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:00:55</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:01:00</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:01:05</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:01:10</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:01:15</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:01:20</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:01:25</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:01:30</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:01:35</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:01:40</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:01:45</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:01:50</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:01:55</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:02:00</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:02:05</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:02:10</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:02:15</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:02:20</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:02:25</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:02:30</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:02:35</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:02:40</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:02:45</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:02:50</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:02:55</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:03:00</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:03:05</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:03:10</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:03:15</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:03:20</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:03:25</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:03:30</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:03:35</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:03:40</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:03:45</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:03:50</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:03:55</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:04:00</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:04:05</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:04:10</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:04:15</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:04:20</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:04:25</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:04:30</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:04:35</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:04:40</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:04:45</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:04:50</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:04:55</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:05:00</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:05:05</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:05:10</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:05:15</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:05:20</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:05:25</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:05:30</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>0:05:35</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
</tbody>
</table>

**TOTALS:**
- 81% spent engaged with nature (04:30)
- 67% spent in social interaction with peers (03:45)
- 3% adults were present (00:10)
- 73% adult presence unknown (04:05)
- 24% boys are older teenagers (01:20)
Table 4-2: The occurrence of engagement with nature and social interaction with peers.

<table>
<thead>
<tr>
<th>Time</th>
<th>Engagement with Nature</th>
<th>Social Interaction with Peers</th>
<th>Autonomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:00</td>
<td></td>
<td></td>
<td>Presence of adults is unknown.</td>
</tr>
<tr>
<td>00:05</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>00:09</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>00:14</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>00:19</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>00:24</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>00:29</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>00:34</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>00:39</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>00:44</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>00:49</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>00:54</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>01:04</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>01:09</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>01:14</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>01:19</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>01:24</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>01:29</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>01:34</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>01:39</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>01:44</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>01:49</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>01:54</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>02:04</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>02:09</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>02:14</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>02:19</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>02:24</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>02:29</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>02:34</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>02:39</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>02:44</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>02:49</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>02:54</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>03:04</td>
<td></td>
<td></td>
<td>Presence of adults is unknown, however boys are older teenagers (16+).</td>
</tr>
<tr>
<td>03:09</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>03:14</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>03:19</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>03:24</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>03:29</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>03:34</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>03:39</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>03:44</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>03:49</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>03:54</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>04:04</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>04:09</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>04:14</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>04:19</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>04:24</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>04:29</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>04:34</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>04:39</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>04:44</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>04:49</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>04:54</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>05:04</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>05:09</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>05:14</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>05:19</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>05:24</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>05:29</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>05:34</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>05:39</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>05:44</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>05:49</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
<tr>
<td>05:54</td>
<td></td>
<td></td>
<td>Presence of adults</td>
</tr>
</tbody>
</table>

59.8% occurrences where engaged with nature and interacting with peers (03:02)
As seen in Table 4-1, autonomy was difficult to code. In the beginning of the video, photographs documented the presence of adults in a school setting. The presence of adults in the remaining photographs was not as clear. Photographs of the cohort playing as elementary school students were taken most likely by an adult. Photographs of the cohort as teenagers in downtown Raleigh may have been taken by one of the boys. Since the level of autonomy was unclear in the YouTube video, clarification was sought in the interviews.

4.2 Interview Findings

For questions 1 and 2, interview data were coded utilizing the themes identified in the Literature Review. Research question 1 (How did socialization influence the engagement with nature of the study cohort playing the Cemetery Branch between 2002 and 2006?) utilized the four domains of social life to code data as in the second Literature Review. Research question 2 (How did nature influence social interaction of the study cohort playing in Cemetery Branch between 2002 and 2006?) utilized the five themes identified in the third Literature Review. Question 3 utilized interview data which addressed the possible influence on behavior of changes within the environment.

4.2.1 Question 1: How did socialization influence the engagement with nature of the study cohort playing in Cemetery Branch between 2002 and 2006?

As in the Literature Review, data pertinent to the socialization → nature relationship were coded using the four domains of social life: attachment, hierarchical, social identity, or reciprocal relationships (Grusec & Davidov, 2010).

4.2.1.1 Attachment

For review, no other relationship is more significant than attachment relationships in regards to coping with stress (Grusec & Davidov, 2010; Mikulincer & Florian, 1998; Repetti et al., 2002). Attachment relationships refer to the proximity between caregivers and a child during times of stress to protect the child’s welfare (Bugental, 2000; Bugental & Grusec, 2006; Grusec & Davidov, 2010). Secure attachment occurs when the caregiver is responsive to a child in distress in a way that the child perceives as consoling (Grusec & Davidov, 2010). Secure attachment results in the child being
more resilient to stress, to better cope with stress, and to adjust behavior to appropriately respond to stress (Mikulincer & Florian, 1998; Repetti et al., 2002).

From the interviews, secure attachment relationships were evident not only between caregiver and child but between caregiver and all children in the study cohort. The caregivers cared for and protected each other’s children. Donna described “the village” created by the parents of the study cohort.

“We also had a group of other parents who—it sort of takes a village. They would look out for each other, and we would let each other know if, you know, the boys didn’t come home or, you know, there was any concern or they needed being picked up. So we kind of watched each other’s back that way, so there was a nice sort of village oversight, and it still goes on today. We kind of check in with each other about things, but I think having other kids with a similar openness to being outside and playing outside and being independent, it really, really helps.

The secure attachment between caregiver and study cohort child was evident in Rose’s interview. At one point in her interview, Rose described the cohort’s personalities. In her descriptions and tone, a sincere fondness for each study cohort member resided. She knew the cohort and loved them as if they were family. She articulated a gentle and loving understanding of each cohort member’s gifts and talents. She described one of her son’s friends in the following way. “I can sort of see him being a leader. He is just the nicest, sweetest, kind of gentle… you know thinks about people’s feelings.”

From the Literature Review, attachment relationships fostered engagement with nature through the secure base. Products of strong attachment included the caregiver as a secure base of exploration (Ainsworth and Bell, 1970; Bowlby, 1988) and an improved reaction to stress in that the child was more resilient to stress, better able to cope with stress, and adjust behavior to appropriately respond to stress better (Mikulincer & Florian, 1998; Repetti, Taylor, & Seeman, 2002). From the interviews, participants recalled accounts of the secure base and opportunities to develop good judgement. (see Figure 4-1).
4.2.1.1.1 The Secure Base of Exploration

The secure base of exploration influenced engagement with nature and served as a foundation for autonomy established through scaffolding experiences. In the secure base, the caregiver acts as a ‘base’ from which the child ventures knowing that they will be welcomed, reassured, and comforted upon return (Bowlby, 1988). Rose was the secure base from which exploration happened for Chris. While Tom played with friends during his time at Conn ES, Rose played with Chris in the creek. A classic secure base scenario included Chris as a toddler venturing from Rose to splash in the water and running back. She knew that Chris could play safely in the creek because she provided early scaffolding experiences. “When he was little it was just me making sure that he was safe, but as they got older the creek’s not very deep, so there really wouldn’t be an issue with that [supervision].” The physical environment, e.g., the shallow creek, afforded autonomy for Chris, but the social environment, e.g., Rose’s assurance from the early scaffolding experiences, contributed to Chris’ autonomy. Rose re-entered the workforce when Chris started Conn ES; Tom entered Middle School and no longer played in the creek. No older sibling or caregiver was there to supervise; however, the autonomous play continued.
The secure base extended beyond the toddler stage. The interviews revealed evidence of the secure base function of the attachment relationship. The caregivers continued to serve as a secure base from which exploration happens. While the cohort played in the creek, they encountered the homeless camping. Donna expressed knowledge of the cohort’s interaction with the homeless. She functioned as the secure base; the cohort explored, encountered the opportunity to manage risk, and reported the details to her. She reassured them, and the behavior continued. Rose functioned in a similar way as a secure base. She cherished and encouraged the cohort’s desire to explore and their resulting adventures. Chris explained,

“I mean I can remember when I was younger like before the creek days that my parents would take me to playgrounds and they would be there but they were never you know like follow me around the playground you know there was always a certain level of freedom that grew you know like towards the creek times and pass them.”

Also, inherent in secure base relationships was the importance of autonomy. In secure attachment relationships, caregivers encourage children to become more autonomous with age (Howe et al., 1999) which was true of the study cohort.

4.2.1.1.2 The Opportunity to Develop Good Judgement

A meaningful difference between the Literature Review data and the interview data was the opportunity afforded the cohort to develop good judgement. The autonomy afforded by caregivers influenced the way in which the cohort engaged with nature. Donna expressed a desire for her children to experience autonomy in her description of her family’s decision for settling in an urban environment.

“I think it is more of an attitude of not worrying and making sure that our kids have exposure to as much as we can expose them to, you know, not trying to sequester them too much in a… you know, controlled and exclusive environment, which is one reason they have always gone to public school and one reason we lived downtown. You know, the last thing in the world is we would—we want them and us to be imprisoned in some sort of gated community. We are very much against that. I mean, we don’t like it. We want to meet different people.”
While settling in an urban environment was a priority of Donna, nature was prominent in that environment. Nature was woven into the fabric of the daily lives of the cohort. In the interviews, the study cohort described nature in a specific way; nature was part of their everyday life and not a destination. Interviews with the caregivers did not present nature as a destination, i.e., packing the car, loading the family, and transporting to a natural destination; instead, nature was part of their everyday life. Rose recalled playing with her children in the remnants of nature spared by the development of the urban environment. “I don’t know if you’re familiar with the neighborhood but there is a place that’s called Popular Springs in the Mordecai neighborhood and it’s this kind of itty bitty tiny creek and that’s how we started playing with [Tom].” Donna admitted that her family could have been more involved in outdoor activities. “And do things like kayak and mountain climb and things that other people do, and we would like to do more camping and haven’t, so I think… I can’t say that we are out in nature all the time.” This view of nature, i.e., nature was part of everyday life and not a destination, was reflected in the way in which socialization influenced engagement with nature by affording the opportunity to display good judgement. For this cohort, socialization influenced engagement with nature in the urban environment by affording autonomy and the ability to display good judgement.

While exploring the natural environment, the cohort had the ability to assess situations, adjust behavior accordingly, and then gained efficacy in their judgement abilities. For the study cohort, natural stressors (wildlife) were present in addition to stressors which occurred in urban environments (diversity of people) which afforded the ability to display judgement. Even though the creek occurred in an urban environment, the creek was home to a variety of wildlife. David recalled an encounter with a rabid raccoon while walking along the creek.

“Like one time, a raccoon that like obviously had rabies was like, you know trying to get us, kind of. I always remember, running just so far away, but like yeah I mean, that sort of thing, I guess makes your courage go up.”

Encountering the rabid raccoon presented David with the opportunity to develop judgement skills which lead to self-efficacy.
The additional environmental stressors present in the urban environment which fostered practicing judgement typically involved other people. Matt displayed good judgement when confronted by people from different backgrounds. From about first or second grade, Matt was allowed to ride his bicycle independently, i.e., without the presence of an adult/autonomously, ½ mile to and from school.

“I always tell the story of how I was riding my bike back in like fourth grade through these houses back there and they used to be…used to be like more low income families. I guess it still is but this black man without his shirt come running up the street yelling at me to give me his bike and the ability for me to like kind of make that judgment and in my mind I was like: ‘Wow it would be really bad if he caught me, but I am on a bike so I can probably get out of here before he gets me’ and so just like being able to help mature those judgment skills. I think it is something that has been very prominent in all of my friends I think it all just comes from parents being hands off and letting them learn for themselves.”

Traveling independently to and from school presented Matt with the opportunity to assess a situation, adjust behavior accordingly, and develop good judgement.

While the presence of nature was not mentioned in Matt’s account, nature may have contributed to Matt’s ability to travel independently to and from school. Research suggests that the presence of street trees is positively associated with the occurrence of independent non-motorized travel to and from school (Larsen et al., 2009). This account strengthens the possibility that socialization influences engagement with nature in the urban environment for this cohort.

Other instances of environmental stressors involve the homeless. During their excursions along the creek, the cohort would encounter the homeless. While the presence of the homeless does not necessarily constitutes actual risk, their presence could constitute a perceived risk. Donna confirms, “They would come across homeless people camping.” Like the two previous accounts, this account demonstrated another opportunity to development judgement skills. In fact, the cohort viewed these encounters and the resulting confidence as distinguishing them from peers. David observed,

“Well, from hanging out like with other people and like they come down to this environment um a lot, a lot of people would be like kind of intimidated you know by being downtown and like you know walking through like low income areas, you’re like you know we’d be downtown
like growing up in this area you know how to handle homeless people coming up and stuff like that and you know everyone else is like, “Oh, oh!” like getting scared and stuff and like we can have conversations with them and like you know be friendly with them and stuff.”

The diversity of environmental stressors in the urban environment presented the study cohort with a variety of opportunities to develop good judgement skills.

4.2.1.2 Hierarchical

Hierarchical relationships refer to the caregivers’ control over resources to encourage submission and obedience from the child (Grusec & Davidov, 2010). From the Literature Review, four themes emerged which addressed the influence of socialization with engagement with nature: change over time, opportunity, time spent, and rejection of control. The most pertinent themes for the study cohort were the caregiver’s control of the amount of time spent in nature, the opportunity of the study cohort to engage with nature, and the cohort’s rejection of caregiver’s control (see Figure 4-2). Examples of ‘change over time’ were not found in the data, since ‘change over time’ refers to the generational change of hierarchical relationships over decades.

4.2.1.2.1 Control over Time Spent

A caregiver’s control over how a child spends their time has morphed into a cultural phenomenon for the middle-class: concerted cultivation. Participation in adult-controlled, structured activities at the sacrifice of a child’s free time is a middle-class phenomenon attributed to concerted cultivation, which is the attempt of middle-class parents to foster their child’s interests through participation in structured or extracurricular activities (Lareau, 2002). In the United States, Lareau (2002) found that the middle-class children who participated in the study spent twice the amount of time in structured activities than working-class children and over triple the amount than poor children. Not only were these activities structured, they were controlled and directed by adults (Lareau, 2002). Bodovski and Farkas (2008) confirmed Lareau’s theory that concerted cultivation was positively and strongly associated with parental socio-economic status (SES). In other words, the higher the parental SES, the more likely a concerted cultivation strategy was employed.
Caregivers in the study cohort seemed to reject concerted cultivation and adapted a child-directed method of parenting. Rose recalled, “[Tom] loved anything to do with nature. Absolutely was just fascinated with anything that had to do with nature. And so especially when he was outside then he uh just yeah it was very calming. And it was the same way with Chris too.” Rose recognized the differences in her sons and adapted parenting style accordingly. Tom flourished with a highly structured schedule filled with activities. “Tom had a lot of afternoon activities. We’ve found like that was very important for him … to keep him as scheduled and as busy as possible.” The types of activities were important; Rose recognized the importance of engaging with nature for Tom.

“We got involved in the Natural Sciences Museum very early on and in fact I was on the board for there for 8 years and still I’m involved in that because it was the one place where I could take him to classes or they would go out on field trips and I would never get a phone call about him misbehaving.”

While Tom flourished with a structured schedule, Chris cherished unstructured free time.
“Chris just was happiest when he was not scheduled. I mean if he could just be out in the world and making up a game so for him he was just so happy out there. So he did not have, we didn’t have a lot of you know afternoon activities or classes or things like that not till he got to high school and took up cross country running.”

Instead of employing concerted cultivation strategies, such as controlling and overscheduling a child’s time with extra-curricular activities, Rose employed strategies which addressed the individual needs of her children. Rose recognized that nature is a vehicle in which to achieve healthy development of her sons and used her control over how her sons spend their time within the hierarchical relationship to facilitate engagement with nature.

“Well I’ve always felt like self-esteem and kids being happy are really important because I think that makes them, them be a successful contributing member to society because if you don’t have internal happiness you’re not going to find it outside [of yourself]. And so discovering what it is that they loved and what interested them and you can from a very early age see what you know makes your kids tick and what makes them happy.”

4.2.1.2.2 Rejection of Control

Of interest to note was the lack of accounts where the cohort rejected their caregiver’s control in hierarchical relationships. Neither the cohort nor the caregivers recalled accounts of rebellion or rejection of caregiver control. No accounts of power struggles between the cohort and their caregivers were present. The lack of rejection of control may be attributed to the level of autonomy granted to the cohort. The caregivers did not control every decision the cohort made; instead the cohort were granted autonomy to make decisions. With autonomy, the cohort understood that the situation was serious when caregivers wanted control and submission to the control should be granted. Matt recalled, “I always think about how much more it means to me like when my parents are screaming at me.”

4.2.1.2.3 Control of the Opportunity to Engage with Nature

Within the hierarchical relationship, caregivers control a child’s opportunity to engage with nature. While the parents of the study cohort encouraged engagement with nature, other adults in
their lives did not. During Matt’s interview, he recalled how some teachers at Conn ES utilized the environment to impose restrictions on the children and that the creek was an antidote to the restrictive school environment. When asked why he played in the creek, Matt responded,

“I think a lot of it was wanting to be unsupervised and have the freedom to like do whatever you want really and kind of go wild, because after being in school all day and having teachers telling you: you can’t go behind the trees, you can’t go in like certain corners. It’s like of the playground you just like really are ready to learn for yourself and have some freedom and not have someone tell you what to do all the time. And so that was…that was really really nice. It was like a nice de-stressing thing after school just to be able to relax with your friends and just do whatever you want and go crazy.”

The environmental dichotomy within the hierarchical relationship was interesting. The opportunity to engage with nature within the hierarchical relationship happened in polar forms. On one end, parents encouraged engagement with nature by allowing the creek play to happen. On the other end, teachers promoted engaging with nature as a means to impose restrictions by referencing natural landmarks, such as trees, to create boundaries on the school playground.

While cohort caregivers were keen to encourage engagement with nature, there was some initial concern about playing in an urban stream. Donna commented, “I don’t think the creek was very clean, and so I think, in that way, maybe we were irresponsible a little bit that way.” However, Donna expressed that the benefits of engaging with nature ultimately outweighed any concerns over the water quality.

“I had some concern about the creek being not clean, the water, but I wanted there to be more creeks and more options since this was really the only one around. I was looking for places like the creek, and we didn’t have enough of them. The free places for kids to play, and there was very little public land, very little non-private land for the kids to play in here, and they were always being chased off, property, so I thought it was a real gift to have the creek for them to play in.”

“They had so much fun and created these lifelong bonds that any kind of risk, health risk, I am hoping is not that great.”
With Rose as with Donna, the potential benefits outweighed the risk. Rose also expressed concerns of engaging with an urban creek but understood that exposure to germs was healthy.

“We thought about [creek pollutants] you know it’s funny I’m not a germ-a-phoebe and never have been and in fact I do feel like it’s important to be exposed to more [germs] because if you’re not you’re gonna get more sick. And we’re lucky I mean at least as far as I knew, I hadn’t seen any, major concerns or people saying ok this creek in particular and there are some creeks I know…in the Raleigh area…where there are more issues like that. You know sometimes you can look at the water and see ok...I mean it’s not, how much algae is there…and that can also be a sign of you know of the health of the creek……and different things like that so um…mainly more just if they knew not to drink it, you’ve got to be careful about that and you know if you’ve got cuts and stuff…just making sure that they were cleaned really well when they came back but overall I’ve always felt like that’s, it’s, it’s good.”

Not all caregivers who children played at the creek shared the opinion regarding the benefits of engaging with nature via the creek. Donna remembered, “There were some parents that forbid their kids [from playing in the creek] because one parent knew more about, maybe, risks of the creek sewage. So some were banned from [playing in the creek].”

4.2.1.3 Social Identity

From the Literature Review, caregivers utilized social identity relationships with children to impart a value system on being in nature and to provide scaffolding opportunities to engage with nature; peers utilized social identity relationships to distinguish themselves among peers and to utilize the shared interest in nature to find friends. The dissertation research confirmed the Literature Review findings but also refined the themes. For example, study cohort caregivers imparted a value system on being in nature; however this seemed secondary to imparting a value on autonomous exploration. Also, cohort peers utilized social identity relationships to find friends who shared an interest in nature; however the friendships of study cohort which started in the creek persist today. The experience of playing in the creek forged long-term friendships (see Figure 4-3).
4.2.1.3.1 Expanding ‘Value Playing in Nature’ to ‘Value Autonomous Exploration’

The caregivers in the study cohort valued playing in nature. They played in nature as children. Donna recalled,

“There was a creek at the bottom of our street, and it had a waterfall, and we used to go down there and play and walk in the woods, and in the winter it iced over, and we would go ice skating.”

They told their children stories of their nature play. Chris recalled stories his parents shared of their nature play. “I think that when my mom was young she had woods in her backyard and so did my dad you know and they would go and they would play in the woods.” The cohort caregivers wanted their children to have the same experiences in nature because their experiences in nature were meaningful to them.

While the caregivers valued playing in nature, the act of exploring autonomously seemed to be more valuable in the social identity relationship for cohort caregivers because they acknowledged that other environments facilitated exploration. The caregivers did not limit autonomous exploration to the creek. Donna explained,
“We have always been adventurous, going places and visiting other cultures, and my husband and I met in the Peace Corps in Africa. And so I think, you know, being open to diversity and other cultures and other people has always been, um, something we have supported and been interested in. We haven’t—I can’t say that we are necessarily outdoorsy.”

She went on to explain,

“I don’t have the bias towards one or the other, nature, but I think—yeah, of course we wanted them to have contact with nature as much as they could, but I think cities are also very educational, and navigating cities is, can be like navigating the landscape.”

The value placed on exploration was evident in the boys’ interviews. Matt recalled,

“Sometimes it was just about exploring the creek. Like seeing how far up the creek we would go and like where we haven’t been before and just kind of figuring out like where the creek went and like figuring out a neighborhood kind of.”

The creek became the spine of the neighborhood for the cohort. It provided safe passage to explore north to play in abandoned houses and south to Oakwood Cemetery. As the cohort aged, their world broadened to include playing in the abandoned warehouses and parking decks of downtown Raleigh.

What began as playing in nature evolved into autonomously exploring the urban environment; therefore marking the shift of ‘value playing in nature’ to ‘value autonomous exploring’. Chris described the transition from playing in nature to autonomous exploring in the urban environment.

“The creek was our place to explore and it was you know like our little realm where we could go and see everything there was to see and as we got older and we all got bikes and our parents let us roam around Raleigh as opposed to just the creek. Raleigh - I would say became our creek in a way um because it was just then that was our place to explore.”

Caregivers recognized that the explorations cultivated in childhood extended into emerging adulthood. Rose acknowledged the desire to explore as an outcome of the boys’ early creek play.

“I think that’s one of the reasons why they can go explore you know a backwoods trail in California or you know a different country because they’re used to exploring starting from a
littl
tiny creek to downtown exploring a little bit more and the world is just you know one more, one more thing to explore.”

4.2.1.3.2 Scaffolding

Rose provided Chris with early scaffolding opportunities at the creek. These early experiences were meaningful to the cohort as Chris was the instigator of the cohort’s creek play. Please refer to section 4.2.1.1.1 The Secure Base of Exploration for more details.

4.2.1.3.3 Distinguish among Peers

From the Literature Review, peers utilized social identity relationships to distinguish themselves from peers who did not engage with nature. Social identity relationships influenced the study cohort’s engagement with nature in similar ways. From the interviews, a clear distinction was made between the children of the study cohort and the other children who did not play in the creek.

Chris, who grew up playing in the creek as a toddler, took Matt to play in the creek after school. Eventually, other children joined the creek play. Matt recalled,

“It was like an evolution that happened because it started it out with just Chris and I and then the [redacted family name] moved up the street and then they started coming. And then the older kids that we didn’t know as well saw us playing down there and then they came. So it really was like stepping stones to what it eventually became with a whole bunch of kids running around down there.”

As the group evolved, so did the play. Initially, the play was active; i.e., a way to relax or release pent up energy after school. Matt described the initial creek play activities after school. “It was like a nice de-stressing thing after school just to be able to relax with your friends and just do whatever you want and go crazy and release energy.” Eventually, the group consisted of between six to eight boys playing at the creek on a regular basis. Matt explains,

“There are always fluctuations where a few kids would come for like a week or so and then not come back for a little bit and then come back just depending on what they were doing but that was always like the main group like since I was 7.”
The familiarity, which arose from playing with a consistent group of friends, changed the nature of the creek play into the creation of a tribal society. Chris explained, “It started off just kind of exploring the creek and then once we had basically explored everything we would play games we kind of made like we had different tribes.”

The study cohort created a society separate from adults complete with tribal affiliations and a bartering system with rules and currency. Non-tribal children played at the corner of Frank and Norris streets near their caregivers; while the tribal boys were further away. In the social identity relationship, the study cohort utilized the tribal system to distinguish themselves among peers, primarily based on how they engaged with nature. For example, David described a non-tribal peer at the creek. “I remember, like, this one kid trying to jump to the side of the creek, and he fell in, and it was just kind of funny because, like, you know, this guy just shows up.” However, the tribal society was not completely closed to new members. David joined the creek play after Chris and Matt had played for two years. As long as a peer shared the common interest of engaging with nature and enjoyed the same level of autonomy, thus distinguishing themselves from other peers, membership into the tribe was achievable. David recalled,

“I don’t really remember like any awkwardness or me being like, ‘Hey, guys, I’m [David],’ and I, I knew most of the, most of the guys like before that a little bit. Like, I knew who [Matt] and [Chris] were and stuff like that, um, but yeah, so I, I just—you know, it just kind of lar came about, really.”

The tribal society also distinguished the study cohort from other cohorts playing at the creek. The previous cohort, consisting of Chris’ brother, Tom, played at the creek, but the play was very different. The play was primarily swinging from a rope and exploring the creek portion near Frank and Norris streets where caregivers parked to retrieve their children after school. Matt explained, “And [Tom] used to go down there and they just had like this little rope tied to a tree and he would just swing on this rope pretty much after class after school every day.” Also, Tom’s group, which consisted of between 1 to 2 other peers, was not as large as the study cohort. The later cohort which consisted of Mickey, Matt’s brother, did not continue the tribal society. Mickey played with the study
cohort at the creek and was part of the tribal society. Once the study cohort left Conn ES, the tribal system died because Mickey did not have friends who wanted to play outdoors. Donna explained,

“I think my younger son, he was part of this group, too, and he has [independence] naturally as well, but his peers, the parents were a different mindset, and they were… he suffered from not having other kids that he could play with outside because they were all indoors or being driven to some arranged event.”

4.2.1.3.4 Expanding 'Find Friends' to include 'Find Long-term Friends'

From the Literature Review, peers utilized social identity relationships to find friends who shared an interest in nature. Social identity relationships influenced the study cohort’s engagement with nature in similar ways, i.e., finding friends; however, these friends are long-term friends. The physical environment supported the continued play with a consistent group of friends which produced long-term friendships. Matt explained, “I know when I think about my friends like my neighborhood friends that I grew up with we will just like never go away like it’s not an option like they are close as family to me.”

The creek facilitated the development of long-term friendships since the cohort continued to play in the creek. The cohort were in different grades; David was a grade ahead of Chris and Matt. They attended different middle schools; David attended Moore Square MS and Chris and Matt attended Carnage MS. However despite no longer attending Conn ES and attending different middle schools, they continued to play in the creek albeit not as frequently. The creek supported continued social interaction. Currently, the study cohort were no longer child, but emerging adults attending college. Again they attended different universities; Chris and Matt attended UNC-Asheville and David attended Appalachian State University in Boone, NC. Although they are pursuing different paths, they continued to maintain their friendship.

4.2.1.4 Reciprocal

From the Literature Review, caregivers granted reasonable requests and peers acted as leaders and facilitators in regards to influencing peers to engage with nature. The interviews produced no mention of the reciprocal relationship between caregiver and child; however, examples
of peer reciprocal relationships existed (see Figure 4-4). In particular, the leadership theme seemed meaningful to the cohort, since Chris’ early scaffolding experiences with Rose at the creek served as the impetuous for the creek play of the cohort.

4.2.1.4.1 Leadership

From the Literature Review, peers acted as leaders by encouraging other peers to engage with nature. For the study cohort, Chris acted as a leader by initiating the creek play of the study cohort. Chris played in the creek as a toddler. Rose took Chris to play while Tom played in the creek. Rose explained,

“So when [Tom] would be playing down there I’d have this little one with me and that was not quite as easy you know, so he would stomp around and he’d been doing that for a long time uh…but not really was invited to play with the older kids.”

Rose’s efforts of scaffolding Chris’ creek play ensured the creek play of the study cohort. Chris’ experiences at the creek before he started school afforded him autonomy in the creek after school when he attended Conn ES. The creek play of the study cohort began when Chris led Matt to the creek to play after school. Matt explained, “Well let’s see I think at first [Chris] was one of the first friends I met at Conn… So I would just start to follow him down [to the creek].”

4.2.1.4.2 Facilitators

From the Literature Review, peers acted as facilitators by ensuring the mutual exchange of benefits. For the study cohort, the mutual exchange of benefits was the facilitation of the cohort’s autonomous exploring. As children, they explored the creek together. As adolescents, they explored Raleigh together. As emerging adults, they explored the world together. The longevity of the study cohort friendships facilitated continued autonomous exploration, the mutual benefit.
4.2.1.5 Question 1 Summary: How did socialization influence the engagement with nature of the study cohort playing in Cemetery Branch between 2002 and 2006?

The research produced data which suggested that socialization agents influenced the cohort's engagement with nature. For the most part, the interview data confirmed the Literature Review findings; however the differences were meaningful. In the attachment relationships of the cohort, the secure base function of attachment relationships was present in the examples of the village-sized effort of rearing the cohort and the caregivers knowing about the risks the cohort encounter; the knowledge of the risks implied that the cohort shared the stories of risk in order to receive comfort from the caregivers. Also in attachment relationships, examples of the secure base and development of judgement skills were evident. From successful early scaffolding experiences, caregivers recognized the abilities of the cohort and afforded them a high level of autonomy. From this autonomy, the cohort experienced risk which may be inherent in nature in the urban environment, such as encountering a rabid raccoon in the creek and a man who wanted to steal a bike. In response
to the situation, the cohort displayed good judgement in that they assessed the situation and responded accordingly. In reciprocal relationships, peers were leaders initiating engagement with nature. The early scaffolding experiences of Chris and Rose at the creek made Chris a leader by bringing Matt to the creek to play which marked the beginning of the formation of the cohort who created the tribal society. In hierarchical relationships, caregivers exercised control over how the cohort spent their time by letting the cohort decide how they spent their time. The caregivers did not adapt concerted cultivation techniques in which they overfilled their children’s schedules with extra-curricular, adult-directed activities; instead, they granted the cohort the autonomy to decide how to spend their time. This decision of the caregivers may have contributed to the lack of interview reports of teenage rebellion and rejection of caregiver control. The cohort understood that when the caregivers wanted control, the situation was serious and submission was necessary. In social identity relationships, two of the themes were refined. First, the caregivers of the cohort ‘value playing in nature’; however they seemed to ‘value autonomous exploration’ more. The caregivers’ accounts of childhood play involved nature, but the meaningfulness of the experience seemed to be the emphasis on autonomous exploration. Having the desire to explore seemed to be important for caregivers to instill in children. Certainly, the desire to explore was repeated in the interviews of the boys. Second, within social identity relationships, peers utilized engagement with nature to find friends; however, with the study cohort, these friendships were long-term. The experience at the creek forged friendships which survived attending different middle, high schools, and universities. The friendships which started at the creek seemed to be the most meaningful friendships of the study cohort to date.

A meaningful distinction arose in understanding the ‘nature’ component of the unidirectional socialization → nature relationship investigated in question one. When participants referred to ‘nature’, they were referring to ‘nature’ in the urban environment instead of ‘nature’ in a natural destination such as a state or national park. In fact, Donna lamented that her family should go hiking, camping, and kayaking more. Accounts of destination nature were mentioned, such as hiking the John Muir Trail, but meaningful childhood memories of nature the participants recalled were of nature close to their homes, or nearby nature, which was true for both caregivers and children. In conducting the research to understand the design of urban environments which foster human development, this
distinction is meaningful. Leftover natural spaces in urban environments may be valuable to healthy development.

Another meaningful finding was the influence of autonomy in the socialization → nature relationship. The cohort caregivers awarded a high level of autonomy in that the cohort traveled independently to and from school as early as the second grade and made decisions about how they spent their time. As seen in attachment relationships, the autonomy may foster judgement skills in that the cohort were navigating the urban environment alone and managing risk to which they displayed a good judgement in their response. The importance placed on autonomy by the caregivers may be related to their high valuation of exploration as seen in social identity relationships. The caregivers wanted the cohort to go out and explore the world on their own as a healthy part of their individual development. This attitude toward autonomy may also account for the lack of stories regarding teenage rebellion as seen in hierarchical relationships. The influence of autonomy was surprising. At the beginning of the research effort, the researcher expected socialization agents influenced engagement with nature because humans receive benefits from nature as discussed earlier. While nature was important to the cohort, autonomy seemed to a meaningful nuance of the socialization → nature relationship.

4.2.2 Question 2: How did nature influence social interaction of the study cohort playing in Cemetery Branch between 2002 and 2006?

Interview data pertinent to the nature → social interaction were coded utilizing the themes identified in the Literature Review. The themes from the Literature Review involved ways in which the natural environment fostered positive social interaction by affording social and cooperative play, supporting autonomy, affording opportunity to interact, creating social ties, and reducing aggression (see Figure 4-5).
4.2.2.1 Themes Consistent with the Literature Review

Findings from the interviews supported the Literature Review findings. From the Literature Review, nature supported social interaction by affording social and cooperative play, supporting autonomy, affording an opportunity for social interaction, and creating social ties; however the ‘reducing aggression’ theme was refined to ‘facilitates conflict resolution’.

4.2.2.1.1 Affords Social and Cooperative Play

While the interview findings were consistent with the Literature Review findings regarding ‘affords social and cooperative play’ theme, the interview data produced a rich, thick description of the cohort’s time at the creek with wonderful accounts of the tribal society the cohort created during elementary school. From the Literature Review, nature fostered positive social interaction by affording social and cooperative play. Nature afforded a multitude of play options suitable for small groups, such as exploring, loose parts play, and construction with natural elements. The creek and the surrounding environment supported many opportunities for social and cooperative play. David
contrasted the play opportunities at the creek and a traditional playground with manufactured equipment.

“I feel like the best play environments are just the ones that let you do what you want to do and like um… I don’t know I feel like you can have fun on like a swing set you know it’s kind of like fun to be on but it’s only fun for like 10 minutes and it’s not really like… it’s like kind of like a different kind of fun you know. It’s like a physical rush whereas like the stuff that we were doing was more like more imaginative and more social.”

The flooding aspect of the creek and the surrounding vegetation afforded social and cooperative play. After heavy storms, the creek flooded delivering many found objects which facilitated social and cooperative play. The vegetation surrounding the creek facilitated social and cooperative play by providing a platform for ‘The Shops’ which are discussed later. The ways in which nature afforded social and cooperative play were best explained through a description of the tribal society which the study cohort created. Rose acknowledged the social nature of the cohort’s play contributed to the creation of the tribal society. “They were not just sharing their experiences physically you know doing things side by side but they discussed it. And so I think a lot of that verbal interaction helped to solidify this little world they created down there.”

4.2.2.1.1.1 The Tribal Society

The creek served as a place to relax and blow off steam after school. As the cohort became more familiar with each other, the play evolved into a rich world completely separate from adults: the tribal society. Matt described, “That was more of the evolution because as we all kind of got to know each other. That was like the product of getting to know each other and playing with each other.”

Eventually, the cohort divided into groups or tribes. The munchkins were the shorter boys and the tree tribe were older boys who congregated in the trees growing along the creek banks. Chris explained,

“So one of the tribes was the munchkins and that was the short people. There were like two or three other people that formed the tree tribe and so we were kind of like the opposing tribes but then there were all sorts of other we would switch around and people would make alliances and there was the pirates and the monkeys and all sorts of stuff like that and it was
never like we wouldn’t like entirely separate ourselves but there was kind of like you know okay that the munchkins are doing this and the tree tribe is doing this.”

Playing in the creek and belonging to the tribal society was meaningful. A child who attended a different ES, but lived in the neighborhood heard stories of the tribal society and wanted to play with the study cohort. His mother drove him to the creek after school to play with the neighborhood children.

4.2.2.1.1.2 Creek Currency and ‘The Shops’ Area

The creek environment enabled the creation of a principle social/cooperative activity of the tribes: the trading and bartering system the cohort developed. After heavy rains, the creek flooded delivering an array of objects waiting for the boys to discover. David explained, “I collected glass and stuff. Bought some sticks with the glass or found good sticks.” The boys collected these found objects and traded them for other objects. Matt described the tribal economy.

“So we all have like…we all have different shops where we would sell little pieces of glass. And [Chris] actually like printed out pieces of paper that said creek currency. And we would just like trade glass and used to trade stocks that were like swords and a lot of it was based around like cool pieces of glass and sticks.”

Chris created ‘creek currency’, to enhance the bartering system.

“At one point we made a currency. I designed like some money that I called creek currency on Word software and printed them out. It kind of looks like a dollar and it said creek currency on it and they were all one dollar creek currencies. We would trade the creek currency for like pieces of river glass and rocks and sticks and stuff like that.”

Overgrown shrubs along the banks of the creek served as ‘The Shops’ where the bartering happened. The boys made dens in the dense shrubs and created ‘shops’ where they traded found objects for other found objects or the creek currency. The boys also celebrated creek Christmas in the shop area. They collected discarded Christmas trees from the street and displayed them in their shops. They also exchanged Christmas gifts, the found objects they collected. ‘The Shops’ area became central to the tribal play.
4.2.2.1.3 Playing with a Consistent Group of Friends.

One of the most meaningful attributes of the natural environment affording social and cooperative play was the creek sustaining play among a consistent group of friends. Initially, the creek play was superficial: relaxing with friends and releasing pent up energy from school. As the boys became more familiar and comfortable with each other, the play evolved into the tribal society. Having a consistent group of friends with caregivers who supported autonomy and outdoor play proved to be critical for the study cohort and their tribal society which was demonstrated by the experiences of Mickey. Donna explained the experience of her youngest son Mickey and the failed continuation of the tribal society.

“I think my younger son, he was part of this group, too, and he has that naturally as well, but his peers, the parents were a different mindset, and they were… he suffered from not having other kids that he could play with outside because they were all indoors or being driven to some arranged event. Even in high school, and so, um… and he has, you know, some kids weren’t even allowed to walk down the street to our house, you know. So the range was really huge, the contrast between the two, but, um, I think it was—I think that is really important is to have a social group of kids that you can grow up with… you were comfortable outside.”

4.2.2.1.2 Supports Autonomy

In the Literature Review, natural environments supported social interaction by affording children autonomy as a product of age (older children were accompanied by adults less than younger children when visiting a forest) and engagement (teachers intervened less when preschoolers were outdoors since the outdoors was engaging and the children displayed less boredom). For the study cohort, nature seemed to support positive social interaction by affording autonomy through a transactional exchange with caregivers.

As discussed earlier, caregivers of the study cohort value playing in nature and granted the cohort autonomy. Without the autonomy to play in nature, the cohort may never have created the tribal society. David recognized,
“And I feel like the reason why we were hanging out with each other was because we had parents that were, you know ‘ok yeah you guys can do that’ …and the parents that were like ‘uh we want you to stay inside the house’ or you know ‘stay within this block’ then we weren’t really hanging out with them because we were outside the block or something, so.”

Caregivers were excited by social interactions of the tribal society at the creek and supported the activity. For example, Donna created the YouTube video to highlight the creek play for a conference presentation. Rose explained, “There really wasn’t much close supervision at all, and we found that they usually did better if there wasn’t. Because they were much more creative, um…they you know they, they knew what they were doing.” Matt recalled,

“Like I remember going there during the weekends and [a friend’s mother] coming and dropping us off sandwiches and like we would be there all day, because there was just so much to do like when you go somewhere every day after school and you like have this fort like this little house you make like there is so much stuff you can do to it where it really is like such a big project and there is like every time you went down to the creek there is always something to do. There was always something to which was really cool.”

Caregivers were willing to grant autonomy to the study cohort. This autonomy coupled with nature in the urban environment to spawn the tribal society which the caregivers found exciting thus fostering positive feelings toward the study cohort. These positive feelings ensured continued autonomy.

4.2.2.1.3 Affords an Opportunity for Social Interaction

From the Literature Review, a natural environment may afford the opportunity for social interaction. The mere presence of nature may afford increased opportunity for social interaction. The creek afforded an opportunity for social interaction because it was conveniently located between school and home. Matt explained, “At least for me, I rode my bike home. I rode by the creek every day and so it was like part of it was it was on the way back to a lot of neighborhoods that a lot of kids lived in.” The cohort had a safe route between Conn ES and the creek with the presence of a crossing guard. As discussed earlier, the creek provided multiple play opportunities and was
engaging enough to ensure play with a consistent group of friends, thus providing an opportunity for social interaction.

4.2.2.1.4 Creates Social Ties

From the Literature Review, the risk inherent in a natural environment may provide the opportunity for membership, thus creating social ties. For example, participating in outdoor activities which included risk created the feeling of membership or belonging for immigrant families (Hordyk et al., 2015). The interviews contained many examples of managed risk. David’s account of encountering a rabid raccoon classified as an opportunity to manage risk in a natural environment.

“Like one time, a raccoon that like obviously had rabies was like, you know trying to get us, kind of. I always remember, running just so far away, but like yeah I mean, that sort of thing, I guess makes your courage go up.”

A meaningful distinction established in the question 1 findings was the cohort recalled accounts of nature in an urban environment instead of a natural destination. With the addition of the urban variable in the physical environment under investigation, the concept of risk may not be dependent on nature; however, the risk described by the cohort was related to nature in some capacity. For example, the cohort while exploring the creek managed risk in the form of the homeless camping. While the homeless may camp anywhere, not just natural areas, the homeless in this instance were camping in a natural area relying on the vegetation to provide cover from authorities who may destroy the camps. Also, the study cohort recalled many instances of being chased off the creek neighbors’ property. The risk of confrontation with the creek adjacent property owners probably would not have existed without the attracting presence of nature, the creek.

Managing these risks inherent in nature in an urban environment created social ties among the study cohort which was evident in the distinction the cohort made between cohort friends and college friends. David explained, “I have friends up at [Appalachian State University] but none of them are like the same sort of thing as my friends here.”
4.2.2.2 Expands ‘Reduces Aggression’ to ‘Facilitates Conflict Resolution’

From the Literature Review, public housing residents living adjacent to green versus barren spaces displayed less aggression. The findings from the interviews were somewhat similar to the Literature Review findings; instead of evidence of reducing aggression, the cohort revealed evidence of conflict resolution.

The cohort were no strangers to conflict. Their time at the creek was filled with stick-sword fights and tribal warfare where one tribe stole from another. Donna recalled, “They would have, like, little wars, and they took it really seriously. They would steal from each other, and, you know, it was like a little caveman society.” Chris recalled,

“So I was a part of the munchkin tribe and then I decided that I didn’t want to be a munchkin that I was going to join the tree tribe because I wanted to hang out in the tree that seemed a lot cooler. So I decided to join the tree tribe and I went up and I was hanging out in the tree and [my friend and I] got into this argument and it was like a very heated argument and he was like I just don’t know why you would leave the munchkins.”

However this conflict was soon resolved. Rose recognized the influence of the environment on the quality of the social interaction of the cohort.

“All of the sudden here’s just this perfect environment to for them to develop as friends, develop as you know just individuals to learn so much, to learn how to interact with each other, to learn how to have fights, to learn how to solve you know to resolve those issues.”

Arguments did not prevent the continuation of their friendships. Nature supported the continued interaction for a consistent group of friends and possibly the resolution of conflict. Chris observed,

“I do think that [playing at the creek] made me better at just letting things go and just being like I can’t hold a grudge to save my life. I just can’t stay mad somebody and so I think maybe that was part of that.”

This consistency of social interaction among playmates that is afforded by nature creates a strong social dynamic necessary to resolve conflict. Chris explained,

“When you spend you know every day of your life with a group of people you are going to get into a lot of arguments and to this day we still hang out and we still argue constantly but I
think something that we really learned was how to like get really mad at somebody or like you know just have this super-heated argument and then just let it go you know like maybe it even maybe people are yelling maybe someone smacked someone in the face, but then the next day you know that you are friends and it is all good.”

The social dynamic may be a product of the development of language skills and imagination from playing in nature. Herrington and Studtmann (1998) found that children (N = 16) with greater physical abilities directed play on manufactured play equipment, while children with greater proficiency of language and imagination, which are indicative of cognitive and social competencies, directed play in natural play environments. While no measure of language proficiency was administered to research participants, advanced development of imagination, as evidenced by the creation of the tribal society, was without question; therefore an assumption was made that the participants had proficient imaginations and therefore a greater social competence. Since children with greater social competence were observed to direct play in natural play environments more than children with greater physical competence, it follows that natural play environments may foster positive social interaction since the leaders were children who were proficient in social skills.

4.2.2.3 Question 2 Summary: How did nature influence social interaction of the study cohort playing in Cemetery Branch between 2002 and 2006?

The interview data supported the Literature Review findings that a natural environment fosters positive social interaction by affording social and cooperative play, supporting autonomy, affording an opportunity for social interaction, creating social ties, and reducing aggression. However, the interview data differed in meaningful ways. First, the data to support the ‘affords social and cooperative play’ theme produced a thick, rich description of the cohort’s tribal play where playing with a consistent group of friends was meaningful. The regularity and consistency of playmates afforded the creation of an amazing world separate from adults. The fact that the study cohort was a consistent group of friends seemed meaningful. The continued social interaction of a consistent group supported their autonomy through a transactional relationship with caregivers, created social ties through the exposure to managed risk inherent in nature in an urban environment, and facilitated conflict resolution.
In question 2 as in question 1, the influence of autonomy was present. From the Literature Review, nature may support positive social interaction by supporting autonomy as a product of age and engagement. For the study cohort, caregivers granted autonomy. Nature in the urban environment, e.g., the creek, inspired and autonomy fostered the creation of the tribal society. Caregivers were so delighted by the tribal society and the positive social interaction of the cohort that they supported continued autonomy. While socialization forces, e.g., caregivers granting autonomy, may be the catalyst for the creation of the tribal society, the engaging quality of nature in the urban environment sustained the activity thus fostering positive social interaction as evident in the tribal society accounts.

4.2.3 Question 3: How did the physical environment influence the bidirectional relationship study cohort playing in Cemetery Branch between 2002 and 2006?

During the interviews, participants described the physical environment in three ways. First, they talked about the convenient location of the creek. Second, they described the physical characteristics which attracted the cohort to play in the creek. Third, characteristics of the physical environment changed over time affecting the creek play.

4.2.3.1 Location

The location of the creek greatly influenced the use. It was conveniently located across Brookside Dr. from Conn ES. Donna explained,

“Because it was accessible. It was right by the elementary school. It was, you know, an easy place for the kids to gather right after school. So it was literally right across the street, and I remember before they even started hanging out there and walking past and thinking, ‘Wow, this is a very cool thing.’”

While the location was convenient, the distance between the creek and the school was enough so that the study cohort perceived the creek as separate from the school. The separation was a product of distance and autonomy. David explained,
“And so I think it started as just kind of like a meeting place, you know, kind of adjacent to where we all went to elementary school that was far enough away from the elementary school that it was kind of like… you know, it didn’t have any teachers or anything.”

While no teachers were present at the creek, caregivers were. Instead of waiting in the long pick-up line, parents parked along Frank and Norris streets to wait for children. The presence of a crossing guard ensured safe crossing of Brookside Dr. While parents socialized, children played in the creek. Rose explained,

“If you would get in the carpool line you’d end up waiting in this long car pool line so this was really convenient to park down here. The kids could just walk across the street, there was a crossing guard so they could walk across and it was a great place to meet.”

The creek was conveniently located on the way home from school for the study cohort. Matt explained, “I rode my bike home. I rode by the creek every day and so it was on the way back to a lot of neighborhoods that a lot of kids lived in.” The creek and the Mordecai and Oakdale Neighborhoods were west of Conn ES. Since the study cohort lived in these neighborhoods, the creek was on the way home for all the cohort. While going to a friend’s house may be out of the way, playing at the creek was not. David explained,

“I wouldn’t walk over to one of their houses because, you know, that’s a little bit up this way, you know, towards Oakwood, and I lived in Mordecai, and so I wouldn’t walk up there. But I could walk down to the creek, and that’s like two blocks away from where I live.”

Also, the convenient location ensured that the study cohort played for extended periods of time without adults present. The caregivers who retrieved their children after school stayed as described by Rose about 30 minutes, but the study cohort continued to play for another one to two hours as previously discussed.

4.2.3.2 Physical Characteristics

The interviews contained much data regarding the physical characteristics of the creek which fostered the creek play activity. The presence of water, the feeling of containment, the wild quality of the creek, the secluded nature of the creek, and the network system of which the creek was part influenced the creek play.
Water as an Attractant

The presence of water seems to attract children. Rose observed, “I've never met a kid who's been anywhere near a creek and doesn't say, “Oh!” or a big pile of water or puddle or something.”

The water in the creek attracted the study cohort. Rose explained,

“I think having the presence of water made a huge difference. There’s just so many interesting things that go on with water you know and that give you, you know allow you to do a lot more stuff and imagine and explore and create with water. I mean you've got your earth, you've got your water, you've got all that kind of stuff yeah I think would of been much more limiting I really do.”

David confirmed,

“It was a lot better than someone’s house because, you know, it was like a creek, and, you know, there’s fun stuff in the creek.”

“Just because like I don’t know I feel like the creeks a lot more fun or like a lot cooler. Um and I feel like there only so much fun you can on like uh actual playground. And it’s a lot more fun to have like your imagination going and like you know being able to trade glass and like you know find and like… whatever on the ground, like an old oil can or something. And then being able to trade that for like a nice stick with someone um… I don’t know I just have a lot more fun at the creek than I think I would have had you know most other places.”

Chris confirmed,

“These are the kids that um we all lived in the same neighborhood and so they were like my best friends who I would hang out with outside of school and that was just an easy time for us to all get together and just do fun stuff at the creek.”

Water attracted like-minded children, i.e., children who wanted to play in nature. The creek forged long-term friendships for the study cohort. Chris explained,

“The creek is kind of the basis of that you know where we all started hanging out it is where all of us met and it is where you know we grew to love just hanging out and exploring and just bummimg around together.”
The portion of Cemetery Branch at Conn ES was not contained within a culvert and was accessible via an open, green space. In other areas, Cemetery Branch was surrounded by private property, was piped underground, or was inaccessible due to overgrown vegetation. Donna explained,

“It was the one place where it was exposed. I mean, in a lot of the other parts of the neighborhood, it’s under culverts or it’s in people’s backyards, and you can’t get to it. So here, it was next to a green and where they could access it and right next to the school, so it was a perfect place to hang out.”

4.2.3.2.2 Containment

While the creek area was not contained by a fence, it felt contained. Fences were present; they occurred along private property lines and above the culvert along Frank Street for safety. However, fences did not block access to the creek. Rose explained, “It was a contained area. We knew it. You know, we’d been down there enough, to be around and say, ‘Ok it’s fine.’” The elevation changed along the creek, the neighborhood roads, and the adjacent houses contributed to the sense of containment. Having a sense of containment without an actual fence may be meaningful. The exploration of the study cohort would have been limited by a fence. Donna observed,

“It wasn’t contained within a fence, you know, and I mean, I think a park, you know, it is very small, like a little tot lot it becomes less interesting, you know, to kids. I mean, here, they can go as far as they want to go, and they don’t have to go through a gate, you know, so I think, you know, we really kill a lot of imagination and engagement by trying to control things too much and make it too manicured and safe.”

The creek was contained enough so that caregivers felt secure in letting the study cohort play autonomously. Then as the cohort aged and their explorations increased, no fences and gates existed to restrict autonomous exploration.

The elevation changes around the creek were meaningful. Areas in which the cohort often played occurred where the slopes were less than 5% and greater than 10% (see Figure 4-6). Area 1 on Figure 4-6 represents one of the original creek play areas of the cohort: the steep slope and creek bed. After school, the cohort ran down (> 10%) and climbed back up the steep slope along Frank
Street (see Figures 4-7, and 4-8). While the creek banks were steep, the creek bed was relatively flat. Area 2 on Figure 4-6 was the relatively flat backyard of a creek-adjacent neighbor. The cohort climbed the steep bank to the flat backyard where they ran and played. This neighbor was the one who often chased away the cohort. Area 3 on Figure 4-6 is 'The Shops' area which will be discussed later.

![Map of Frank Street, Area 1, Area 2, Area 3]

*Figure 4-6: 1. The cohort ran down the steep slope (>10%) along Frank St and accessed the creek here. 2. The cohort were frequently playing in this backyard which caused negative interactions with the property owner. 3. Location of 'The Shops'.*
Figure 4-7: Study cohort played on steep slope at the creek along Frank Street; looking east toward Conn ES. Photo taken from the YouTube video (grebo58, 2012).

Figure 4-8: Study cohort played on steep slope at the creek along Frank Street; looking north. Photo taken from the YouTube video (grebo58, 2012).
4.2.3.2.3 Wild Quality

The creek has a wild quality that attracted the study cohort. David explained, “It was like an open place, and, at the time, it seemed like a pretty—you know, it seemed like almost like the wilderness. It wasn’t really the wilderness because we were in people’s backyards.” Even a small remnant of nature, these leftover spaces which development did not touch, can feel like wilderness to a child. A few trees planted in a buffer becomes a forest to a child (Louv, 2008). Donna explained, “I remember them coming back and saying how they had found these huge cliffs and ‘How could there be cliffs?, but there were like these large sort of big rock faces, which in their mind were cliffs.”

The wild quality of the creek activated the study cohort’s imagination. David explained, “You’ll find a really deep section of the creek or something. Like wow that’s really neat or like some big vines and I just remember feeling like I was in Vietnam or something like on some like expedition.” David continued, “I think it was just kind of like a new… kind of like a new frontier almost.”

4.2.3.2.4 Secluded and Private

While the creek was accessible, it was secluded and afforded privacy to the study cohort. David explained, “It was kind of like, an area that was secluded enough from the rules or, like, the outside world. You know, a place for kind of like, a hideaway but like a larger, longer form, I guess.”

As discussed earlier, autonomy facilitated the creek play. Inherent in autonomy are seclusion and privacy from adults. David continued,

“It’s just kind of like a secluded area that’s—you know, there’s not that many people, and it’s just kind of like, you know, an area that we had, um, not really to ourselves but just like, you know, we could kind of do whatever.”

The seclusion of the creek reinforced the influence of autonomy by providing places for the cohort to escape. Without this privacy, the tribal system may never have formed since the cohort’s play was more creative without the presence of adults. Rose explained, “There really wasn’t much close supervision at all, and we found that they usually did better if there wasn’t. Because they were much more creative, um…they you know they, they knew what they were doing.”
While the creek was secluded and private, it was also part of a larger network connecting to other creeks, neighborhoods, and areas within Raleigh, NC. Connecting to other creeks and watersheds, the creek was a magical place after a flood. After heavy rains, trash washed along the creek banks. David remembered, “It was a lot better than someone’s house because, you know, it was like a creek, and, you know, there’s fun stuff in the creek like—find, like, you know, trash.” These found objects became a critical component of the tribal society. David explained,

“I remember one time like we were looking for glass shards we were using to like as money and so like I remember we were like we walked like really far down this way and we found like probably like 15 shattered bottles we were like, ‘Heeeellllyyyyy yeah! Payday!’ And so that was like… you know so then like there’s talk of like a mining operation you know going on like way out and then like you know we’d go down there and get the glass and then bring it back here [The Shops].”

David continued, “Like, I found a bunch of, like, car parts one day. I thought that was really cool because there was, like, these rusted-out car parts. People were always finding, like, cool stuff.”

These glass shards and car parts became currency in the tribal economic system. The cohort traded or sold these found objects for other objects in ‘The Shops’ which is discussed later. In addition to commerce, the study cohort created art with the found objects in the creek. They built tiny shrines of broken glass and ceramic shards (see Figures 4-9 and 4-10).

As the cohort aged and their explorations increased, the network characteristic of the creek facilitated exploration of other areas of Raleigh. Matt explained, “Like seeing how far up the creek we would go and like where we haven’t been before and just kind of figuring out like where the creek went and like figuring out a neighborhood kind of.” As the boys were allowed to travel farther on bicycles, their networks expanded into the surrounding city. Chris recalled,

“The creek was our place to explore and it was you know like our little realm where we could go and see everything there was to see and as we got older and we all got bikes and our parents let us roam around Raleigh as opposed to just the creek. Raleigh - I would say became our creek in a way um because it was just then that was our place to explore.”
Figure 4-9: Found object art created by the study cohort. Photo taken from the YouTube video (grebo58, 2012).

Figure 4-10: Found object art created by the study cohort. Photo taken from the YouTube video (grebo58, 2012).
4.2.3.3 Temporal Considerations

Toward the end of the cohort’s time at the creek, two meaningful changes in the physical environment occurred which may have affected the play of subsequent generations. First, ‘The Shops’ were located on private property, and the owner erected a fence blocking access. Second, benches were added along Norris Street.

4.2.3.3.1 The Loss of ‘The Shops’

‘The Shops’ area was a key setting in the tribal play. From the interviews, this was the center of the tribal commerce activity (see Figures 4-11 and 4-12). Matt explained,

“So we all have like…we all have different shops where we would sell little pieces of glass. And [Chris] actually like printed out pieces of paper that said creek currency. And we would just like trade glass and used to trade stocks that were like swords and a lot of it was based around like cool pieces of glass and sticks.”

Figure 4-11: Found objects are displayed in ‘The Shops’. Photo taken from the YouTube video (grebo58, 2012).
Donna recalled,

“They had shops and they also had—in addition to the printed money, they had little bits of glass that they used as money, and then they had these shops. They set up these shops along the creek, and they were made up of things that they had found in the creek, that had washed down, and they had bits of pottery and glass and other stuff, and so I was just fascinated, you know. I went down there and thought, ‘Wow!’ So I went down there; I wanted to photograph these little shops that they had set up on different parts [of the creek].”

The Shops were located along the creek bank and on private property in one on the few flat areas adjacent to the creek. An *Elaeagnus pungens* which grew along the creek on private property afforded the opportunity for the study cohort to create dens within its massive structure. In addition to the creek banks, these dens were used as shops to display found objects collected in the creek (see Figure 4-12). The property owner was not thrilled that their backyard was the site of the tribal play.

David remembered,

“This used to be, like, super overgrown. It’s kind of like a fun little adventure place right back in here, and then I’m pretty sure we took over… I guess it was like this guy’s lawn—like his backyard was pretty much just our—like, it became kind of, like, our backyard. Yeah, it was on the Brookside side. And then, like, you know, some guy lived right here, and, uh, he didn’t like us playing in his yard. I just remember one time, like, uh, [Matt] was on the other side. He came out, and he was going to grab [Matt], and [Matt], like, jumped across, and it was a really scary time. We had to run away.”

Eventually frustrated by trespassing children, the property owner erected a fence separating the children playing in creek from the den area which was such a critical area in ‘The Shops’ play of the tribal society (see Figure 4-13). The loss of this play area may have negatively affected the creek play. Mickey, Matt’s younger brother, was a member of the tribal society and played with the study cohort after school. Once the study cohort graduated Conn ES and moved to middle school, the tribal society died. Although Mickey continued to attend Conn ES, he did not continue the tribal play. Donna explained, “He [Mickey] suffered from not having other kids that he could play with outside because they were all indoors or being driven to some arranged event.” While the social environment, e.g., the
lack of friends who played outdoors, influenced the play, the loss of this critical play area may have also contributed to the end of the tribal society. Continued access to ‘The Shops’ area may have attracted other children who were interested in playing outdoors, thus the tribal society play may have endured.

Figure 4-12: Top—Photograph of ‘The Shops’ area. 1. Dens within an *Elaeagnus pungens* shrub serve as shops. 2. A shop with found objects displayed on a makeshift shelf. Photos taken from the YouTube video (grebo58, 2012).
Figure 4-13: Left—The dens within the structure of an *Elaeagnus pungens* shrub located on private property are separated from the creek when the property owner erects a fence. Right—The entrance to the dens is still visible.

4.2.3.3.2 The Addition of Benches

The creek became a spot where caregivers waited for children after school. Caregivers socialized while the children played in the creek. Typically caregivers waited 30 minutes for children to play, then left. The study cohort continued to play for another one to two hours after the caregivers left. As discussed earlier, this autonomous play seemed critical in the formation of the tribal society.

As the tribal society continued, cohort caregivers became excited by the nature of their children’s imaginative play. Donna recalled, “So I just knew it was a passing thing [tribal society], you know, and so I just wanted to document it, and that is why I was going down there taking photos.” The creek play brought joy to the caregivers. Rose remembered, “I still laugh about the creek money and all that. I just still think that’s just one of the funniest things that I have ever heard.” As the tribal play evolved, cohort caregivers began to occasionally gather at the creek. They would bring food and socialize while the cohort play. Donna recalled, “Sometimes, we would come and sit by the creek and
bring a bottle of wine and pizza and hang out there, and it was just a real great gathering place, a casual gathering place.” Eventually more and more caregivers began to congregate at the creek.

Donna continued,

“As new people started coming to the creek, like I was saying, other parents would come in, and they had girls, and they were the ones who got more protective with it. They were the ones who started intervening and kind of putting a kibosh on the fun because they wanted to make sure everyone was safe. It is always about safety, and no one had ever been hurt. They had been playing at the creek for six years, and no one got hurt.”

While at the creek, cohort caregivers did not intervene or interfere with the play; as other caregivers joined, this was not always the case. The interference of non-cohort caregivers began to impede the tribal society play. Donna observed,

“It was sad because my impression is that it became more of a parent hangout, and the kids were there, too, but the parents, the parent presence got bigger and bigger, and so there were more parents there overseeing and stuff, and were—in the past, it was really a kids’ world, and an occasional parent came.”

To accommodate the increased number of caregivers at the creek, the City of Raleigh installed benches along Norris Street sometime between 2007 and 2014, according to historic aerial photographs (see Figure 4-14). Although the actual date is unknown, the benches were installed sometime near the end of the study cohort’s time at the creek. Chris explained,

“I think that was more of the kind of second generation of the creek kids. For us it was pretty consistently just you know us hanging out and there was really no problem with that um but it seems like more parents started to hang out with kind of the second wave of kids came along.”
The increase of caregivers at the creek denoted a shift in the play activity from the autonomous child-directed tribal society to a greater parental influence. Donna explained,

“Yeah, it became like a popular place, and people saw people hanging out there, and it would be a place where kids would gather after school, and then they would come and pick up their kids there, and, um, so it became more popular, but then, yeah, it kind of changed the dynamic with parents being there.”

The presence and placement of the benches had negative consequences. When sitting on the bench, caregivers had a direct view of ‘The Shops’ area (see Figure 4-15). The secluded and
private quality of the creek which attracted the cohort is now diminished with the installation of the benches.

Figure 4-15: The entrance to ‘The Shops’ area, highlighted in red, is visible from the benches.

While the environmental changes may have had a negative impact on the tribal society, the changes were reasonable reactions to the situation. First, the property owner probably erected the fence to protect against liability. The *Elaeagnus pungens* shrub may be considered an attractive nuisance with the presence of the dens, and therefore the property owner may be liable for any injuries on their property. A property owner protecting themselves against a potential lawsuit is a reasonable action. The action of the City of Raleigh is also reasonable. In an effort to accommodate the increased number of adults at the creek, the City installed benches along Norris Street. With an increased presence of caregivers who interfered with play, the children experienced less autonomy.

The study caregivers and cohort recognized autonomy as having a meaningful influence on the evolution and continuation of the tribal society. While the environmental changes were reasonable, they may have unintended consequences on the tribal play in that the play did not
continue. From the interviews, the influence of socialization on the discontinuation of the tribal play was known since Mickey did not have playmates who were allowed to play outdoors. In addition to the socialization influences, the environmental changes may have negatively influenced the bidirectional relationship in that access to engage with nature and autonomy were restricted.

4.2.3.4 Question 3 Summary: How did the physical environment influence the bidirectional relationship of the study cohort playing in Cemetery Branch between 2002 and 2006?

The location and physical characteristics of the creek positively influenced the bidirectional relationship between nature and socialization. The convenient location of the nature facilitated the social interaction of the study cohort. The creek was located across the street from their elementary school. Agents of socialization, i.e., caregivers, supported the cohort engaging with nature since the presence of a crossing guard ensured safe passage to the creek. The physical characteristics of the creek, e.g., water, containment, wildness, seclusion, and connectivity of a network, attracted the cohort’s attention and inspired the creation of the tribal society and positive social interaction. Caregivers were excited by the tribal play and continued to grant autonomy which facilitated the continuation of the tribal play. The slope of the creek may have had an interesting effect on play.

From the photographs highlighted on the YouTube video and interview accounts, the memorable play areas of the cohort may be related to topography. Either relatively flat areas (< 5%) or relatively steep areas (> 10%) seemed to be the main play areas of the cohort at the research site, the portion of Cemetery Branch across Brookside Dr. from Conn ES.

Environmental changes may have negatively impacted the creek play. The loss of a major play area of the tribe, ‘The Shops’, and the addition of benches may have contributed to the discontinuation of the tribal play. Probably out of fear of potential litigation, the property owner erected a fence blocking access to ‘The Shops’ area. Also, the City of Raleigh installed benches in order to accommodate an increasing number of caregivers at the creek. With the loss of ‘The Shops’ and the loss of autonomy in the increased number of parents, the tribal society discontinued. While these actions were reasonable, they had unintended consequences on the tribal society. The social environment changes as well in that fewer caregivers allowed their children to stay at the creek for
extended periods of time to play. Changes in the physical and social environments essentially resulted in the dismemberment of the tribal society.

4.3 Summary

The Literature Review guided the research findings. The most meaningful findings occurred in the ways in which the findings differed from the literature review. The first research question investigated the influence of socialization on the engagement with nature of the study cohort playing in Cemetery Branch between 2002 and 2006. When the findings from the Literature Review were applied to research question one, meaningful differences emerged. Within attachment relationships, caregivers granted autonomy to the cohort which was emblematic to the secure base function. With this autonomy, the cohort was granted the opportunity to develop good judgement. In reciprocal relationships, peers were leaders initiating engagement with nature. The early scaffolding experiences of Chris and Rose at the creek made Chris a leader by bringing Matt to the creek to play which marked the beginning of the formation of the cohort who created the tribal society. In hierarchical relationships, cohort caregivers did not employ concerted cultivation techniques which involves enrolling children in structured, adult-directed extracurricular activities in order to ensure enrollment to a prestigious university; instead caregivers allowed the cohort to decide through the autonomy granted. No memories of rejection of the control inherent in hierarchical relationships occurred in the interviews which may be attributed to the level of autonomy granted. In social identity relationships, caregivers influenced the cohort’s engagement with nature by valuing autonomous exploration and peers influenced engagement with nature by utilizing nature to forge long-term friendships.

The second research question explored the influence of nature on socialization which was operationalized as the social interaction of the study cohort playing in Cemetery Branch between 2002 and 2006. The Literature Review found that nature fostered positive social interaction by affording social and cooperative play, supporting autonomy, affording opportunity to interact, creating social ties, and reducing aggression. The findings supported the Literature Review findings but differed in meaningful ways. First, accounts of the social and cooperative play of the cohort provided a thick, rich description of an elaborate tribal society completely separate from adults. Nature, i.e.,
Cemetery Branch across from Conn ES, fostered positive social interaction as evident in the tribal society. Second, the creek fostered positive social interaction by supporting autonomy. Nature in the urban environment inspired the creation of the tribal society. Caregivers were excited by the tribal society and continued to grant autonomy. Lastly, the theme of ‘reducing aggression’ was refined to ‘conflict resolution’. The cohort recalled memories of sword fighting with sticks and tribal disputes; however conflict was quickly resolved and the play continued.

The final research question sought to understand the influence of the physical environment on the bidirectional relationship of the study cohort playing in Cemetery Branch between 2002 and 2006. The location and physical characteristics of the creek positively influenced the bidirectional relationship between nature and socialization. The convenient location of nature in the urban environment facilitated the social interaction of the study cohort. Agents of socialization, i.e., cohort caregivers, supported the cohort engaging with nature since the presence of a crossing guard ensured safe passage to the creek. The physical characteristics of the creek, e.g., water, containment, wildness, and seclusion and privacy, attracted cohort attention and inspired the creation of the tribal society and positive social interaction. Topography contributed to the feeling of containment; the cohort seemed to be attracted to extremes in topography since play occurred where slope was either relatively flat (< 5%) or relatively steep (> 10%). Caregivers were excited by the tribal play and continued to grant autonomy which facilitated the continuation of the tribal play. The environmental changes, e.g., the loss of play space and the addition of benches, may have negatively impacted the creek play. While these environmental changes represent reasonable actions, they had unintended consequences on the creek play.
Chapter 5: Discussion

5.0 The Influence of Autonomy

The Literature Review and the cohort interviews suggested that the nuance of autonomy influenced both directions of the bidirectional relationship between socialization and nature. The finding of the influence of autonomy was surprising. During the study cohort interviews, the researcher expected to hear about the positive effects of engagement with nature. While engaging with nature was meaningful to the study cohort, the level of autonomy granted seemed to be more meaningful. The cohort seemed to talk more about autonomy than nature.

Three possible reasons explain the meaningfulness of autonomy to the study cohort. First, autonomy may appear to be more meaningful than engaging with nature to the study cohort because it truly was. For this particular group of people, autonomy may be more meaningful than engaging with nature. Second, the influence of autonomy may be highlighted by the contrast of autonomy granted to their peers. As the study cohort attended different middle and high schools and college, they were exposed to a variety of people. As they shared their experiences with their new peers, they may have reflected upon previous experiences and understood how much autonomy they experienced compared to peers. David recalled,

“So there’s plenty of other kids that live in the neighborhood that weren’t at the creek, or that weren’t you know hanging out with us. And I feel like the reason why we were hanging out with each other was because we had parents that were, you know “ok yeah you guys can do that” …and the parents that were like “uh we want you to stay inside the house” or you know “stay within this block” then we weren’t really hanging out with them because we were outside the block or something.”

Third, Donna’s video presented the creek as the antithesis of the restrictive school environment of Conn ES. She explained her frustration with the restrictive school environment in that children were not allowed to socialize during lunch.

“You weren’t allowed to talk because if you talked, you wouldn’t eat, and it would take too long, and so they would put these cups down, meaning no one can talk, so the only sort of
social time you had, you were not allowed to talk. And so—I mean, there was just—like, things like that just really burn me up.”

Donna recognized that the creek environment represented freedom for the cohort. She also recognized that the creek play was fleeting. Her sons and their friends would not be young forever.

“...And I just think the creek was a great anecdote to that because they—you know, in the public school, they were just trying to keep control of the animals, you know, and so it was nice that the animals were let loose and let to do what they wanted to do right after, and they loved it, too. I mean, I think it made it much more humane going to school to have that afterwards. So, um, yeah, I knew it was a rare phenomenon and wanted it documented, um, and also for it to make sort of a commentary on the school, public school, the way they can sometimes go overboard and be overly fearful and restrictive and rigid, exactly. These are kids. And they squash them too much just trying to control people and make them be nice and sit and be quiet, you know. So I think that—I understand the challenges and all of that, of course, but still, I think we do too much of the other, you know.”

Beyond her opinions about Conn ES, she voiced these opinions in the video. At the beginning of the video, the following written narrative appeared:

“A short story about a group of boys who went to school together, and grew up together, and grew up together, in downtown Raleigh, NC. Each day, they went to school, where they were obedient and good. They sat “criss-cross applesauce” and stayed on the third square when walking down the hall, waiting for the freedom bell to ring, waiting for the moment when they could cross the street, throw their book bags over their shoulders, and race down to the creek.”

All of the cohort interviewed saw the video which framed their reflection of their experience at the creek. David reflected,

“It made me think about like the positive impacts that this sort of activity has and I hadn’t really thought about that up until like she made that video. And even after she made the video I had to like think about it for a while and then when I saw her talk at that Growing in Place conference it was kind of like… Oh! Huh… yeah I guess, I guess you are right about that. It
was like huh and then like you know I start thinking more about it…and then I realized like the actual impacts that it did have.”

From David’s interview, the influence of the video was clear. The video not only sparked but framed the reflection. The narrative at the beginning of the video clearly emphasized the importance of autonomy in contrast to the restrictive school environment which may explain the focus on autonomy in the study cohort interviews. Whatever the reason for the emphasis on autonomy in the interviews, the influence of autonomy on the bidirectional relationship was clear.

5.1 Socialization → Nature and Autonomy: Home Range

Autonomy influenced the socialization → nature relationship for the study cohort. From the interviews, autonomy seemed to affect all four social domains which typify socialization: attachment, social identity, hierarchical, and reciprocal relationships. Chris’ early scaffolding experiences at the creek were typical of the attachment relationship and ensured his autonomy at the creek once he attended Conn ES. Without this autonomy, the tribal society may never have existed. Rose valued autonomous exploration and wished her son to be autonomous in the social identity relationship. This early autonomy made Chris a leader in the reciprocal relationship since he initiated the creek play for the study cohort. The level of autonomy granted the cohort may make the cohort more willing to submit to caregiver control in the hierarchical relationship since no stories of teenage rebellion were conveyed.

5.1.1 Home Range

The early autonomy at the creek evolved into autonomy in middle childhood and adolescence for the study cohort. As more autonomy was granted, the cohort’s range from home expanded. In secure attachment relationships, caregivers encourage children to become more autonomous with age (Howe et al., 1999) which was evident in the cohort’s home range. Home range is experienced as the secure base function of attachment relationships where parents determine boundaries of exploration which typically increase as children age. Home range refers to the range or distance from home in which children can travel autonomously. Interview data from the study cohort revealed the relationship between autonomy and home range. First, the cohort experienced autonomy at the
creek, then they explored Oakwood Cemetery, then they ventured to Hillsborough Street, and finally to Downtown Raleigh and the railroad tracks (see Figure 5-5).

Early in elementary school, the cohort played at the creek near the corner of Frank and Norris streets. As the tribal society formed, exploration became a focus of the play, e.g., exploring the creek up- and down-stream and hunting for glass and other found objects for bartering. Eventually, the cohort outgrew the creek and explored other areas of Raleigh. David explained,

“We had this kind of independent thing going on at the creek and we had a lot of fun together at the creek. And so after we stopped going to Conn and kind of the creek we grew up and like the creek kind of got smaller you know we’re sort of looking for other you know other places to kind of do the creek thing at.”

The adventures along the creek happened on foot. Home range increased as the cohort utilized bicycles more. Chris explained,

“Well just the way the creek was our, when we were that age the creek was our place to explore and it was you know like our little realm where we could go and see everything there was to see and as we got older and we all got bikes and our parents let us roam around Raleigh as opposed to just the creek. Raleigh - I would say became our creek in a way um because it was just then that was our place to explore.”

They biked to Oakwood Cemetery and eventually to Hillsborough Street near North Carolina State University (NC State). Matt explained,

“And you can like you can go to some pretty strange corners of [Oakwood Cemetery]. So we would just play like tag on our bikes with our mountain bikes we go through the fields and stuff and chase each other down other. Then of course when we got hammocks, climbing the trees and hammocking the trees was a lot of fun.”

As the cohort aged and became more adventurous, their home range expanded to other, more urban areas of Raleigh. Matt explained,

“We used to do like a lot of exploring through downtown and there were a lot of times we would go to NC State and try to like we were into like hopping down stairs on our bikes. And
just like we would bike around a lot at NC State. They also had better food by NC State. Cheap food, cheap college food.”

Figure 5-5: Map of the cohort’s home range. 1. Cemetery Branch (research site). 2. Oakwood Cemetery. 3. Hillsborough Street business district. 4. Downtown Raleigh and the railroad tracks.

Their home range boundaries expanded with age to include exploring the railroad tracks and downtown Raleigh where they climbed abandoned warehouses. From the YouTube video, photographs depicted the cohort skateboarding in parking decks, planking on electrical boxes, and hanging from fire escape ladders. In the interviews, the cohort recalled stories of climbing abandoned warehouses in downtown Raleigh. David remarked on the coffee shop where we met, “And even this
for instance used to be like, before they redid it, it was just like an abandon building that had like all this stuff and you could get on top of the roof really easily…”

Throughout the interviews, only one mention of a car occurred. The majority of transportation seemed to be either walking or biking. David talked about driving to the railroad trails.

“Most of the time we were outside, we were just like biking around or, like, riding around, and so, um, [the railroad track] was kind of like an area that was close by that, um, was, you know, a place that you could—it was a lot like the creek, you know. There wasn’t—it was secluded and stuff, and, like, you know, it wasn’t as close to our houses, but that didn’t really matter at that point because, you know, we had, we were biking more, like, I guess, at 16 or 17. I had a car, too, so you would just drive down there, too.”

5.1.2 Home Range and a Shift in the Balance between Natural and Urban

The progression of the cohort’s home range occurred along a spectrum of mostly natural places to mostly urban places (see Figure 5-6). For example, the cohort began their social and cooperative play at Cemetery Branch across from Conn ES. Although evidence of urban elements existed, e.g., Frank St. culvert and a sewer manhole, the creek was mostly natural. As the cohort aged, home range expanded and the balance between natural and urban environments shifted. From the creek, the cohort ventured to Oakwood Cemetery where they utilized the pathways for bicycle tag. Urban elements were more obvious with the presence of pathways and tombstones; however the Cemetery was still natural, only less than the creek. Eventually, the cohort frequented the cheap eateries catering to college students along Hillsborough Street. Although street trees occurred along both sides of Hillsborough Street, urban elements were starting to overpower nature. Finally, the cohort discovered the joys of climbing the abandoned warehouses in Downtown Raleigh where, for the most part, nature was not present and urban elements were more dominant than nature.

In reflecting on the early scaffolding experiences of Chris at the creek with Rose while Tom played after school, home range seemed to serve as a scaffolding experience for the cohort in order to understand how to exist in an urban environment. While their early experiences of autonomy occurred largely in natural areas within an urban environment, the cohort eventually ventured into the surrounding urban environment.
As the cohort age, home range expands and the balance between natural and urban environments shifts.

5.1.3 Home Range and Walk Score

The progression of the cohort’s home range expanded into areas with higher walk scores (see Figure 5-7). Walk scores are determined by proximity to amenities. The closer the house is to a variety of amenities, the higher the walk score (Vanderbilt, 2012).

As mentioned earlier, the Mordecai neighborhood was recognized as one of the top 5 best neighborhoods in Raleigh based on walkability scores (Cross, 2013). As seen in Figure 5-7, the Mordecai neighborhood (area 1 which includes the cohort’s homes, the creek, and Conn ES) has a walk score of 55. As the cohort aged, their home range expanded into areas with progressively higher walk scores. Walkability may be an important variable for autonomous exploration since the cohort relied on walking or biking when traveling to destinations.

While the neighborhood may have a suburban feel with detached single family dwellings, the first-ring neighborhoods was integrated into the urban fabric. Interestingly, as the home range expanded, destinations became more walkable but less natural. The design challenge is to create urban places with high walk scores and nature present.
Figure 5-7: The study cohort’s home range areas from Figure 5-4 transposed unto a Walk Score Map modified from www.walkscore.com/NC/Raleigh.

5.2 Nature → Socialization and Autonomy: Playing with a Consistent Group of Friends and the Tribal Society

As discussed earlier, nature may foster positive social interaction by supporting autonomy through a transactional relationship with caregivers. For example, the autonomy granted the cohort facilitated the creation of the tribal society. Caregivers were interested in and excited by the tribal play and recognized the influence of autonomy on the creation of the tribal society; therefore caregivers continued to grant autonomy.
5.2.1 Playing with a Consistent Group of Friends

The initial and continued autonomy of the cohort ensured that the cohort were a consistent group of friends. As described in social identity relationships, the creek was the setting for the creation of long-term friendships. Initially, the cohort played at the creek in a very physical way, e.g., running around and climbing trees. Eventually, as the cohort became more familiar with each other, the play became more imaginative. The familiarity, which arose from playing with a consistent group of friends, changed the nature of the creek play into the creation of a tribal society. Nature in the urban environment inspired the characteristics of the creek tribal society. Tribal names and tribal territories were based on nature, e.g., the tree tribe’s base was located in the trees. Also, the creek inspired the bartering system of the tribes. Flood waters deposited found objects which the cohort used to barter. The creek inspired Chris to create creek currency as another means of payment instead of bartering.

While the initial autonomy granted by agents of socialization facilitated the tribal society, nature in the urban environment inspired the play and fostered positive social interaction.

5.2.2 Autonomy and the Rise and Fall of the Tribal Society

The influence of autonomy in the socialization \( \rightarrow \) nature relationship was evident in the creation of the tribal society. Matt identified autonomy as a main influence. “I think a lot of it was wanting to be unsupervised and have the freedom to like do whatever you want really and kind of go wild.” Also, the cohort seemed to crave autonomy and recognized that their caregivers understood the benefits of autonomy. Chris explained, “I think that they knew it really was just like an all-around good thing to give the kid the freedom to do something like that.”

They wanted an existence separate from caregivers. David described the desire to have autonomy in wanting to find places to play which were secluded from the adult world.

“It was, you know, far enough away from the elementary school that it was kind of like… you know, it didn’t have any teachers or anything. It was like an open place, and at the time, it seemed like a pretty—you know, it seemed like almost like the wilderness. It wasn’t really the wilderness because we were in people’s backyards, but it was kind of like, you know, like an area that was secluded enough from, you know, the rules or, like, the outside kind of world.”
Seclusion from the outside world was important in the tribal society. The cohort did not seem to enjoy outside intrusions. When Donna went to the creek to photograph the cohort, they ran from her. “I went there and took pictures, and they always ran from me and tried to hide.”

Despite the desire for autonomy, adults were present at the creek. Caregivers of children who were not tribal members congregated along Norris Street, while their children played after school. These non-tribal children only played for 30 minutes. The parental supervision limited the tribal play, but once the parents left, tribal play continued. David explained, “I guess I was kind of, like, limited by, maybe by parental supervision. And plus it was only for, like, I guess as long as their parents were willing to stick around.” While the non-tribal children played for 30 minutes, the cohort played for hours. David explained,

“It’d probably be for like two hours, an hour and a half depending on just, you know, like, kind of whatever was going on. You know, so school would get out like at 3:00, usually like 3:30, and so, I feel like I’d be down there till probably like 5:00, 5:30. Some days would be later than others. But yeah, I mean, I have memories of, like, walking back and, like, you know, it, like, getting darker, and those are probably during the winter.”

Since the tribal children played for approximately 2 hours, the presence of other parents only lasted for 30 minutes; therefore the tribal children played autonomously for 1.5 hours. If cohort caregivers were present, they were there for emergencies only and not to supervise or direct play. Matt explained,

“It wasn’t ever like they were watching us the entire time like they were just there in case we needed them to be there for some emergency. But they weren’t ever there like we didn’t really talk to my mom making sure she was at the creek with my old dog I just never even thought about it and just went and played with my friends. So they were there for like a precaution.”

Unfortunately, once the study cohort graduated from Conn ES, the tribal play discontinued. Although, Mickey, Matt’s younger brother, was part of the tribal society, he did not have friends who played outdoors. Donna explained, “[Mickey] suffered from not having other kids that he could play with outside because they were all indoors or being driven to some arranged event.” While the lack of
peers who enjoyed engaging with nature brought about the end of the tribal society; so did the lack of autonomy. Donna recognized that Mickey’s peers were “being driven to some arranged event” which signals a lack of autonomy. Also, while caregivers have always been present at the creek after school, the number of caregivers seemed to increase once the study cohort left Conn ES. Chris explained,

“I didn’t really notice [parents] becoming more involved with the creek um yea I think that was more of the kind of second generation of the creek kids um for us it was pretty consistently just you know us hanging out and there was really no problem with that um but it seems like more parents started to hang out with kind of the second wave of kids came along.”

Donna also recognized the rise of parents at the creek. “Usually, it was kids and not parents, and now I think that it’s gotten a little bit more parentally biased.” This lack of autonomy and the rise of the parents at the creek contributed to the end of the tribal society.

5.2.3 Autonomy and the Negative Social Interactions

Nature did not always foster positive social interactions. While the influence of autonomy in the nature → socialization relationship fostered positive social interactions, it also produced negative social interactions with creek-adjacent property owners and other caregivers.

5.2.3.1 The Negative Interactions with Creek Neighbors

The autonomy granted to the cohort influenced the way in which they engaged with nature which influenced their interactions with creek neighbors. Along Brookside Drive, the creek is bordered by private property. Sometimes the cohort blurred the lines between public and private land. David explained, “We didn’t really have the sense of this is someone’s property”. Caregivers worried about the impact on the creek neighbors. Rose recalled,

“Initially, we were just being concerned about the neighbors and that that was not a problem for them. Because the people that lived closest that first house there um…I don’t think they had children and there were times it seemed like where there were some I don’t know, I don’t remembering hearing any complaints but the kids would say, ‘Oh yeah so and so came out and said we were too loud’.”
With no adults present to supervise the cohort and direct them from private property, negative social interactions between the cohort and creek neighbors arose. Each cohort member interviewed recalled negative social interaction with creek neighbors. David recalled,

“I just remember one time, like, [Matt] was on the other side. He came out, and [the property owner] was going to grab [Matt], and [Matt], like, jumped across [the creek], and it was a really scary time. We had to run away.”

Chris remembered,

“There was part of the creek was kind of located along a few people’s backyards and sometimes they would be like, ‘Get out of here, you kids. Scram.’ or whatever and then that was about it then they would tell us get out we would you know for the most part stay out of those areas.”

Matt recalled,

“And they just like and they would always tell us to leave and um go somewhere else or to get off and um not the people that bought the house with that concrete slab down I guess where that hill is right there. They cut down our rope swing that used to be by the tree and they um I think they ended up cutting down the tree. But yea I just like…yea…I just like people…I mean living on the creek having all of these kids there all the time I could see it being annoying. Yea that was probably like the only other grown up and actually you would have those kind of negative I think.”

5.2.3.2 The Negative Interactions with Other Caregivers

While autonomy benefited the cohort by facilitating the creation of the tribal society and fostering long term friendships, the level of autonomy granted to the cohort caused conflict between caregivers of the study cohort and caregivers of non-tribal children. Donna was ostracized for the value she placed upon autonomy. Caregivers who did not grant their children autonomy had negative interactions with Donna. Matt recalled,

“My mom got into a few fights actually with parents telling other parents to not tell them what to do because they had no right to tell them what to do if they want to hit each other with sticks then like if they hit each other too hard they will just learn once they do it. And yea, I
remember a few times that has happened, but I think that was like the goal that we were all looking for is like not to have any type of parent influence and I think that is really strong for a lot of kids to try and find that.”

Donna recalled negative interactions with parents who did not grant autonomy to their children. “There was a neighbor, and she was—she had an only child, very protective of him, and, um, she—I guess the school was having a, um, fair, and I offered to watch her child and another neighbor’s child. They’re both very protective, and they wouldn’t let me—yes, they would not leave their kids with me because I was too cavalier and I was not protective enough of children. So, yeah, there is some backlash with parents who, in my mind, are hung up and worried too much, and so—and that is, you know, that is their issue, but that is right. And then yeah, at the creek, there were some parents who were trying to tell the kids to put the sticks down and “Let’s play nice” and, you know, “You can’t do that,” and it was just way too much parental interference and, um… you know, yeah, there sometimes will be accidents, but… you know, my experience has been there has never been any great harm done to anyone, and, um, you know, I would much rather my kids grow up… having a full experience of life and having some adventure than, um, just being chauffeured around in air-conditioned minivans to their next lesson or sports event. To me, that is not a childhood.”

While autonomy seemed to benefit the development of the study cohort, cohort caregivers paid a price among other caregivers, particularly Donna, for granting autonomy.

5.2.4 Outcomes of the Influence of Autonomy: Development of Judgement and Desire to Explore Autonomously

Many researchers identify an affinity for nature expressed in environmentalism in adulthood as an outcome of the bidirectional relationship between socialization and nature. When children experience unstructured, free play in nature, i.e., autonomous, self-directed play in nature, they develop an affinity for the natural environment and choose environmentally focused careers and/or recreational activities in adulthood (Bixler et al., 2002; Chawla, 2007). This seemed to be the case for the study cohort. Chris, David, and Matt enjoy outdoor recreation. They mentioned camping, hiking, and mountain biking during the interviews. Also, they are studying environmentally-focused majors.
Chris is majoring in Environmental Science with a concentration in Ecology, David is majoring in Urban Planning, and Matt is majoring in Environmental Policy. In addition to adult environmentalism, the development of judgement skills and a desire to explore autonomously seemed to be outcomes for the study cohort experienced from their time playing in the creek.

5.2.4.1 Development of Judgement Skills

During their autonomous explorations, the cohort had the opportunity to develop judgement skills. In other words, they had the opportunity to evaluate and respond to a situation independently from adults. This experience instilled within them confidence in their decision-making ability. Matt explains, “And so just like being able to help mature those judgment skills. I think it is something that has been very prominent in all of my friends.” As documented earlier, David encountered a rabid raccoon while exploring the creek, Matt escaped the threat of having his bicycle stolen, and the cohort experienced confrontations with creek neighbors and encountered the homeless camping along the creek bank. These experiences afforded the opportunities to assess a situation, adjust behavior accordingly, and as a result develop judgement skills. When faced with the opportunity to manage risk as a child, e.g., the threat of having his bike stolen, Matt autonomously assessed the situation and selected an appropriate course of action which contributed to his self-efficacy. Matt explained,

“This black man without his shirt come running up the street yelling at me to give me his bike and the ability for me to like kind of make that judgment and in my mind I was like, ‘Wow it would be really bad if he caught me, but I am on a bike so I can probably get out of here before he gets me.’ And so just like being able to help mature those judgment skills. I think it is something that has been very prominent in all of my friends. I think it all just comes from um parents being hands off and letting them learn for themselves.”

The study cohort developed good judgement as Matt described it since they made decisions autonomously as children.
5.2.4.2 The Desire to Explore

The continued autonomy facilitated the continued exploration of the physical environment. From the experiences as children exploring nature in the urban environment, the cohort began to develop confidence in their ability to manage risk. As they entered emerging adulthood, they continued to explore. Every summer, they planned a big trip. One summer they hiked the John Muir Trail in California, and the summer of the interviews, they explored Peru. The study cohort traveled without the safety of a tour group unlike their college peers. David explained,

“I think that’s kind of like not that many people do that. Where they go with like a group of their friends just to like explore and I mean like a lot of people do but like, it is like sort of uncommon. Like a lot, a lot of my friends are like peers at [Appalachian State University] for instance are going like out of country but like everyone that was going out of country was like going through like a program or something.”

The willingness to explore without the safety of a tour group may be a product of the judgement skills the study cohort acquired from the early creek play. David explained,

“When people ask, ‘Why are you going to Peru?’ I’m just like ‘You know we’re just kind of running around like, seeing what we could do.’ They’re like, ‘Oh wow, ok that sounds, that sounds fun.’ But, you know so we were like, we get in like funny situations maybe but like we were always able just to like ‘Haha, this is, haha, like, we’ll get through it’ and so, and I mean we always did too. But I feel like that upbringing made us more comfortable in that situation.”

The display of good judgement to these difficult situations in Peru may have been a continuation of the good judgement skills acquired from playing in the creek. The study cohort developed good judgement skills in the presence of managed risk within the autonomous landscape of their childhood which translated into continued good judgement in adulthood.

5.3 The Nuance of Autonomy

The nuance of autonomy in the bidirectional relationship seemed to be meaningful in the existing literature and for the cohort. Autonomy was present in both literature reviews exploring the bidirectional relationship between nature and socialization. Articles in the first review regarding the socialization \(\rightarrow\) nature relationship identified the secure base function of attachment relationships
between caregiver and child as influencing engagement with nature. In secure attachment relationships, caregivers act as a secure base from which children venture to explore (Bowlby, 1988). Inherent in the secure base function is the provision of scaffolding opportunities which foster autonomy. For example, caregivers set boundaries within which children are allowed to explore autonomously. As children age, boundaries increase. The scaffolding of boundaries supports greater autonomy. Also, the autonomy afforded the cohort the opportunity to develop judgement skills. In their autonomous explorations, the cohort encountered experiences where they utilized good judgement skills to assess the situation and adjust their behavior accordingly. Autonomy was critical in the cohort’s opportunity to develop good judgement skills.

Articles in the second review regarding the nature → socialization relationship identified autonomy as a means by which the natural environment facilitated positive social interaction. Playing in a natural environment may facilitate autonomy by supporting autonomy, i.e., the absence of caregivers, and fostering positive social interaction among peers. Nature may facilitate the creation of a world separate from adults in which children play cooperatively limiting the need for adult control.

The nuance of autonomy dominated the interviews. Autonomy was mentioned in the findings of the all research questions. The autonomy granted the cohort resulted in the formation of the tribal society and the creation of long-term friendships. Initially, the autonomy granted the cohort provided privacy that the cohort credited to the creation of the tribal society. The continued autonomy ensured the continuation of the society. In addition to changes in the social and physical environment previously mentioned, autonomy lessened for non-cohort children playing at the creek and the tribal society vanished as more caregivers gathered at the creek. The outcomes the cohort received from this autonomy seemed to be development of judgement skills through managing risks inherent in nature in the urban environment and a desire to explore which persists into emerging adulthood.

5.3.1 Autonomy and Child Development

Autonomy is important to healthy development. The Skar and Krogh (2009) article which documented the change in a child’s engagement with nature over time also documented the decrease of autonomy. Participants who were children from 1945-1960 and 1960-1980 reported that play was self-directed, and no adults were present. However parents of contemporary children
between ages 5-11 reported being more involved in their child’s lives from transporting them from activities and increased supervision. Excessive parental supervision may be robbing children of important experiences needed for healthy development. Research suggests that children whose parents adopt an authoritative parenting style experience higher self-esteem than children whose parents adopt an authoritarian, permissive, or neglectful parenting style (Aunola, Stattin, & Nurmi, 2000). Authoritative parents are very demanding and very responsive to children. In contrast, authoritarian parents are very demanding but not responsive, permissive parents are very responsive but not demanding, and neglectful parents are neither demanding nor responsive (Siegler, DeLoache, & Eisenberg, 2003). In other words, authoritative parents allow children to experience age-appropriate autonomy, authoritarian parents typically do not allow children autonomy, and permissive and neglectful parents allow children an inappropriate amount of autonomy. Research suggests that girls from authoritative families experienced the lowest level of depression and the highest level of concentration ability when compared to girls from authoritarian, permissive, and neglectful families (Aunola et al., 2000). The positive outcomes associated with authoritative parenting styles may be attributed to the opportunity to problem solve and think critically when children are allowed autonomy (Hess & McDevitt, 1984). In fact, research links autonomy to increased feelings of happiness in adolescents (Aunola et al., 2000; The Children’s Society, 2013).

Beyond the benefit to development, autonomy may be something that children actually crave. The concept of autonomy was a reoccurring variable that children in the United Kingdom identified as a necessary component of a good life (The Children’s Society, 2013). A 10 question survey which assessed happiness based on life satisfaction identified family relationships (β = .178), choice or autonomy (β = .163), and money and possessions (β = .139) as the most influential variables affecting happiness and well-being in U.K. children (The Children’s Society, 2013). In fact, children who perceived a lack of autonomy because they did not “feel free to express their ideas and opinions” were six times more likely to have low well-being (The Children’s Society, 2013, p. 19). The study also found that children’s happiness with their level of autonomy varied by age. Children experienced a 10% drop in their happiness with their level of autonomy or ability to choose between the ages of 8 and 15 but increased significantly around age 16/17 (The Children’s Society, 2013). The
researchers suggested that this increase with happiness with their level of autonomy represented a mismatch between the amount of autonomy desired and the amount of autonomy realized for early teenagers (The Children’s Society, 2013). However, no reasons for the mismatch were proposed. One possible explanation could be linked to independent mobility or the freedom of movement without adult accompaniment (Alparone & Pacilli, 2012). At age 17, an adolescent can obtain a driver’s license in the United Kingdom which is also the age that survey respondents experienced an increased happiness with their level of autonomy. However, independent mobility may occur before an adolescent can drive a vehicle. Research suggests that parents, particularly mothers, control at what age a child is independently mobile (Alparone & Pacilli, 2012; Prezza, Alparone, Cristallo, & Luigi, 2005). This influence of the social environment (parents controlling independent mobility) has implications for the physical environment. In order for a child who is not driving age to walk, bike, or skate independently to school, a playground, or a friend’s house, the physical environment must be designed to provide a route which parents perceive as safe for a child to be independently mobile.

5.3.2 Barriers to Autonomy

If autonomy is beneficial to development and children crave it, then why do children experience limited autonomy? The physical, social, and cultural environment, specifically the parental perception of these environments, greatly influences a child’s opportunity for autonomy. Research suggests that maternal perception mediates the influence of demographic, psychosocial, and environmental variables to the age at which a child is independently mobile (Alparone & Pacilli, 2012). Parental perception of social danger as summarized in the slogan “stranger danger” and traffic have been identified as important factors affecting autonomy (Prezza, et al., 2005).

5.3.2.1 Barriers to Autonomy: Stranger Danger

Stranger danger is a term coined in the 1960’s in the United States as a campaign to warn children of the potential danger that strangers may present (“Stranger danger,” n.d.). The phrase, “stranger danger”, had a prominent role in the changing autonomy of children. The heightened risk awareness for a child’s safety created by stranger danger combined with the nostalgic remembrance of past childhoods where children roamed free created a cultural environment that greatly affected the
autonomy of children (Pain, 2006). In neighborhoods where parents perceived a high crime rate, children were three times as likely to only play in their yard during the week compared with the children of parents that did not perceive their neighborhood as dangerous (Veitch, Salmon, & Ball, 2010). In other words, these children living in neighborhoods with a perceived high crime rate were restricted to playing in their yard with limited opportunity for the autonomy inherent in independent mobility.

“The stranger is often invoked in cultural explanations as a symbolic, rather than real threat to children’s safety” (Pain, 2006, p. 224). Statistics support this statement. Real strangers may be less dangerous than family members or acquaintances. More children are victims of crime perpetrated by someone they know (OJJDP, 2010; OJJDP, 2012). In 67% of the juvenile (0-17 years old) homicides committed between 1980 and 2010, the offender was known. Of these known offenders, 84% were either family members (38%) or acquaintances (46%) (OJJDP, 2012). Strangers only accounted for 15% (OJJDP, 2012). The victim-offender relationship in sexual assault of juveniles is no different than homicide. In 2008, statistics showed that strangers accounted for 1.8% of sexual assaults of children age 6 or younger, 2.7% of the sexual assaults of children age 7-11, and 5.7% of the sexual assault of children age 12-17 (OJJDP, 2010). Family members or acquaintances were the primary offenders. Although statistics suggest that the danger from strangers is more perceived than actual, fear of strangers greatly impacts a child’s opportunity for autonomy.

5.3.2.2 Barriers to Autonomy: Traffic

Parental fear of traffic limits children’s opportunity to autonomy. “It is above all unattractive living surroundings with heavy street traffic which hinder unaccompanied play and restrict opportunities for social contacts among children and adults” (Hüttenmoser, 1995, p. 7). However, the street has not always been filled with high volumes of traffic. The majority of adults who were children in Amsterdam in the 1950’s and 1960’s classified themselves as outdoor children who experienced autonomy (Karsten, 2002). Streets were a major play space for these children since houses in Amsterdam were small with limited room to play. As more residents purchased cars, streets were no longer play spaces (Karsten, 2002). Traffic volume and parental perception of traffic affecting children’s opportunity to autonomy is not limited to the Netherlands. In the United States, children of
parents who perceived the neighborhood street as safe were six times as likely to play in the street, court, or footpath at least 2 days during the week (Veitch et al., 2010).

Unlike the perception of fear surrounding “stranger danger”, statistics confirm parental fear of traffic. In 2010, almost 75,000 pedestrians were involved in traffic crashes and 4,280 of those pedestrians died which represents a 4% increase from 2009 (Department of Transportation, 2010). One of the most at-risk groups is children. In 2010, 19% of children aged 5 to 9 who were killed in traffic crashes were pedestrians (Department of Transportation, 2010). Of the pedestrians involved in traffic accidents in 2010, children age 15 and younger accounted for 7% of the fatalities and 23% of the injuries (Department of Transportation, 2010).

5.4 Autonomy and the Pattern in the Findings

When reviewing the findings, a pattern emerged. Several key concepts contained the notion of a fixed point which acts as a starting point of exploration and serves as a returning point (see Figure 5-8). Caregivers acted as the fixed point in the secure base function of human attachment with autonomy influencing the path and return of exploration. As the cohort aged, the secure base was expanded to account for an increasing home range in which the balance between nature and urban shifts as discussed earlier. Finally, the creek seemed to function as the fixed point around which home range and exploration occurred. The creek serving as the fixed point may imply that the creek functioned as the secure base function of place attachment.

The concept of nature as a fixed point was present in the Literature Review. In the Hordyk et al. (2015) study of immigrant families in Canada, an eight year old female participant described nature in the following:

“Nature always stays in her place…but gives us the courage to travel and move because she knows she will always be there. Your family and friends go to other countries where they will go and stay forever. The trees and leaves will always be at their side” (Hordyk et al., 2015, p. 77).

Nature is the fixed point from which to venture. As a fixed point, nature connects you to family and friends who move.
5.4.1 The Secure Base Function of Human Attachment and Autonomy

As discussed in detail, caregivers in secure human attachment act as secure bases from which exploration occurs; when in distress, children return to their secure base for comfort (Bowlby, 1988). From interview accounts, caregivers acted as the secure base for the cohort in that caregivers were aware of the managed risks the cohort encounter in nature in the urban environment which implied that the cohort sought comfort from caregivers. Also, inherent in the secure base function of human attachment relationships is the importance of autonomy. In secure attachment relationships, caregivers encourage children to become more autonomous with age (Howe et al., 1999).

The level of autonomy granted the cohort influenced many variables in their experience at the creek. First, the cohort were empowered with the luxury of free time which may be unusual in middle-class families as suggested by concerted cultivation, e.g., middle-class parents enrolling children in structured, adult-directed extracurricular activities in an effort to ensure acceptance into a prestigious university. The cohort caregivers seemed to reject the notion of concerted cultivation by allowing the
cohort to determine how they occupied free time. The cohort decided to continue to play at the creek for hours after the other caregivers who collected their children after school at the creek left which afforded the cohort privacy from adults. Along with an increasing familiarity within the cohort and the inspiration of the natural environment, this privacy proved to be instrument in the creation of the tribal society. The level of autonomy granted the cohort influenced their trajectory to and from the secure base as seen in accounts of their home range.

5.4.2 Home Range and the Shift from Natural to Urban Environments

The home range of the cohort is displayed in Figure 5-6. The home range begins in the portion of Cemetery Branch directly across Brookside Dr. from Conn ES where the cohort played during elementary school. In late elementary and early middle school, the cohort ventured to Oakwood Cemetery, where they played bicycle tag. Then in middle school, the cohort ventured to the Hillsborough St. district adjacent to North Carolina State University. They arrived by bicycle and skateboard to take advantage of the cheap food options catering to college students. Finally in high school either by bicycle or vehicle, they explored the railroad tracks and downtown Raleigh. While in downtown Raleigh, they explored abandoned warehouses climbing to the roof to view the surrounding city.

As the cohort aged, their home range increased due to the autonomy they were afforded. An interesting characteristic of the destinations within the home range was the shift from mostly natural environments to mostly urban environments. Although the cohort ventured into mostly urban environments as they got older, they continued to return to the creek. The pattern of the home range of the cohort mirrored the pattern discovered in the findings: a fixed element which acts as a starting and returning point of exploration. The creek was the fixed element which the cohort ventured from to explore but returned to for comfort. The creek appeared to function as a secure base.

5.4.3 The Creek as a Possible Secure Base

As the study cohort described their experiences in the interviews, the creek appeared to serve as a secure base of exploration much like caregivers in the secure base function of attachment relationships.
As soon as he was mobile, Chris played in the creek regularly which became a meaningful event for the study cohort since the creek play began with him. He introduced Matt to the activity in the second grade and then the other cohort members followed. Initially, the play was confined to the shallow creek bank at the southeast corner of Frank and Norris streets. Eventually, they cohort followed the creek exploring their neighborhood. Matt recalled,

“Sometimes it was just about exploring the creek. Like seeing how far up the creek we would go and like where we haven’t been before and just kind of figuring out like where the creek went and like figuring out our neighborhood kind of.”

The exploration which the creek fosters led the cohort to other areas of Raleigh, e.g., Oakwood Cemetery, the railroad tracks, and Downtown Raleigh. However, they continued to visit the creek after they graduated from Conn ES. David recalled,

“And so we still hung out, and periodically, we would meet up with [a friend] down there. We would climb trees and stuff. And so that went on till probably like, probably like most of 7th grade.”

The creek was meaningful to the cohort in that they shared their experiences with high school peers. Matt explained,

“A lot of times it was kind of like trying to show [high school friends] our lifestyle to get them to understand and like it is funny like bringing people to the creek and like showing them around Raleigh and like ‘That is what we used to do.’”

The cohort returned to the creek because the creek reminded them of their childhood, e.g., their fond memories of the tribal society. The creek comforted them. Matt described the creek as, “It was just like a sanctuary we could go.” As the cohort grew older, the creek seemed to act like a secure base. The study cohort ventured from the creek to explore other areas but returned to the creek for comfort.

Human attachment and place attachment may be similar concepts through the notion of the secure base. Typically, attachment relationships occur between caregivers and children; however in the case of the study cohort, eventually the creek seemed to function as a secure base. As they matured, their home range expanded to include areas like Oakwood Cemetery, the railroad tracks,
and Downtown Raleigh; however they continued to go to the creek. They shared their experiences at the creek with high school peers. They ventured from the creek, explored, and returned to the creek for comfort. Perhaps place attachment functions similarly to human attachment.

5.4.4 Place Attachment

Several conceptualizations regarding place attachment exist in the literature. The existence of related concepts, such as sense of place and place identity, in the literature creates confusion about the meaning of place attachment. Research utilizes terminology of possibly distinct concepts interchangeably which compounds confusion. Also, place attachment and related concepts are defined in a variety of ways. For the purposes of clarity, the dissertation research utilized the tripartite model proposed by Scannell and Gifford (2010).

5.4.4.1 Place Attachment: Tripartite Model (Person-Process-Place)

In response to the growing interest in place attachment and the multiple definitions in the literature, Scannell and Gifford (2010) proposed a tripartite model to account for the influences of person, process, and place on the formation of place attachment (see Figure 5-9). The person-process-place model frames place attachment as a meaningful connection between an individual or group to a place of varying social and physical characteristics displayed as psychological processes such as affect, cognition, and behavior.

5.4.4.1.1 Tripartite Model: Person

The person dimension of the tripartite model involves individual and group associations. Individual associations involve “the personal connections one has to a place” (Scannell & Gifford, 2010, p. 2). Meaningful places conjure memories of meaningful experiences. The personal experiences connected to the place create meaning and promotes self-identity (Scannell & Gifford, 2010). Group associations contribute to place attachment through shared, constructed meanings of place. Places of cultural, historical, or religious significance are meaningful to group members who ascribe to these group associations.
5.4.4.1.2 Tripartite Model: Process

Process in the tripartite model refers to the psychological processes involved in place attachment: affective, cognitive, and behavioral (Scannell & Gifford, 2010). Affective processes involve the emotional response to place. While positive emotions are involved, the response is more than just experiencing positive emotions. The emotional connection to the place satisfies a basic human need (Scannell & Gifford, 2010). The affective response to place may not be positive; negative emotions may occur. However, place attachment, unlike human attachment, is typically conceived as a positive association (Scannell & Gifford, 2010).

Place attachment involves cognition in that attachment evokes memories, constructed meaning, and erudition of place (Scannell & Gifford, 2010). While memories, constructed meaning, and erudition of place may involve emotions, the cognitive process refers to the brain actively processing information regarding place.
The behavioral aspect of the process dimension of place attachment involves maintaining a physical closeness to the place (Scannell & Gifford, 2010). Longevity at residence, religious pilgrimages, and homecomings are examples of maintaining proximity to meaningful places. While proximity to place is meaningful, venturing from place regularly is also meaningful (Scannell & Gifford, 2010). As in secure human attachment, an infant ventures from a caregiver, explores, and returns for comfort. The analogy is similar for place attachment. Regularly venturing from a meaningful place is healthy; while reluctance to leave a meaningful place, such as a home, is considered dysfunctional (Scannell & Gifford, 2010).

5.4.4.1.3 Tripartite Model: Place

Place may be the most meaningful dimension of the tripartite model. Beyond a “meaningful location”, place can refer to a bounded and identifiable unit, an area for social interaction, or various scaled places, such as homes, communities, regions, or countries (Lewicka, 2011, p. 209). Scannell and Gifford (2010) envision place attachment involving social and physical place attachment occurring at various scaled places. Scannell and Gifford (2010) report research investigating social and physical place attachment. Social place attachment seems to form a stronger attachment than physical place attachment; however, the physical characteristics of place are meaningful to place attachment in regards to the symbolic meaning attached to the characteristics of place. For example, “a developed area may symbolize ‘community’, or an underdeveloped area may symbolize ‘wilderness’” (Scannell & Gifford, 2010, p. 5). Physical place attachment occurs in the meaning of the symbolic interpretations constructed by the person.

5.4.4.2 The Cohort and the Tripartite Model of Place Attachment

The tripartite model of place attachment organizes the experience of the cohort to account for the variables which influence the cohort’s place attachment (see Figure 5-10). Each member of the cohort was associated as an individual and a group member in the tribal society. The creek supported social and physical place attachment. Social place attachment was evident in the meaningfulness of the tribal society activity focused at the creek; physical place attachment was evident in the accounts of the constructed meaning of the wild quality of creek as a wild place ready for exploration and
adventure. Also, physical place attachment was seen in the significance of connection. The creek existed as part of a hydrologic network connecting the cohort to other areas of Raleigh along Cemetery Branch which they explored. As they aged and their home range increased, connection was interpreted as not necessarily utilizing the creek for exploration, but connecting to other more urban areas of Raleigh, such as railroad tracks and Downtown. The shift of exploring more natural areas (the creek) to more urban areas (Downtown Raleigh) may highlight physical place attachment. While the cohort connected to and explored Raleigh, they returned maintaining close proximity to the creek (behavior). Cognition was evident in the volume of memories the cohort remembered about their time playing at the creek and the meaningfulness of this experience. Lastly, the cohort displayed a strong positive affect for the creek.

*Figure 5-10: The tripartite model of place attachment organizes the experience of the cohort.*
5.4.5 Human and Place Attachment

Human and place attachment may be related concepts. Much like human attachment, place attachment may afford a sense of security. Bowlby (1988) describes human attachment as the infant venturing from a caregiver to explore the surroundings and returning to the caregiver in times of stress for comfort providing a sense of security. Place attachment providing a sense of security is illustrated in the process dimension of the tripartite model. To view a place as providing a sense of security requires a strong affective bond (affect) to the place, memories and knowledge (cognition) of the security, and maintaining a close proximity to the place (behavior) (Scannell & Gifford, 2010). With the feeling of security, place attachment may function like human attachment in that exploration occurs from the object of attachment, either a human or a place.

Morgan (2010) proposed a method to integrate human and place attachment through emotion. Emotion is integral in human attachment in that an emotional response to the environment drives a child back to the caregiver to whom they are securely attached. As seen in the Person-Process-Place Tripartite Model of Place Attachment, emotion influences the formation of place attachment (Scannell & Gifford, 2010). “‘There is no action and no thought that is not affectively motivated… Motivation underpins agency and motivation is always emotional’ (Basch, 1988, pp. 68-69)” (Morgan, 2010, p. 14). Motivation provides the link to combine human and place attachment. Morgan (2010) utilized Lichtenberg’s theory of five motivational system which influence human behavior. The five motivational systems are: physiological regulation, attachment/affiliation, exploratory/assertive, aversive, and sensual/sexual (Lichtenberg, Lachmann, & Fosshage, 2011). Morgan (2010) utilized the attachment/affiliation and exploration/assertion systems to link human and place attachment. The attachment/affiliation system motivates children to seek out the attachment caregiver; the exploration/assertion system motivates a child to explore their surroundings in an effort
Figure 5-11: “Integrated model of human attachment and place attachment” (Morgan, 2010, p. 15)

Figure 5-12: The integration of human and place attachment conforms to the bidirectional relationship. Modified from (Morgan, 2010, p. 15).
to attain efficacy (Lichtenberg et al., 2011). However, the environment must inspire exploration/assertion. As seen in Figure 5-11, a child motivated by the exploration/assertion system ventures from the attachment figure into the physical environment; the sense of efficacy motivates the child to engage with the physical environment instead of engaging only with the attachment figure (Morgan, 2010). In times of distress, the attachment/affiliation system is activated motivating the child to return to the attachment figure. In a secure attachment relationship, the attachment figure soothes the child and the child is once again motivated by the exploration/assertion system to explore the physical environment (Morgan, 2010). In terms of the bidirectional relationship, socialization (human attachment) influences engagement with nature (place attachment) and in turn nature influences socialization (see Figure 5-12).

To note, Morgan (2010) utilized Lichtenberg (1989) to develop the integrated model of human and place attachment. After Morgan (2010) was published, Lichtenberg et al. (2011) revisited and revised the five motivational systems. The original theory of the five motivational systems was developed from an attachment perspective only. In other words, the work did not account for motivational influences which occurred over the lifespan; instead motivational influences were identified only through an infant’s relationship with the attachment figure (Lichtenberg et al., 2011). In considering the influences over the lifespan, Lichtenberg et al. (2011) reexamine the attachment/affiliation motivational system. First, the caregiving aspect of attachment/affiliation is separated into a distinct motivational system since a necessary motivation of caregiving is to rear a child who is independent so that the caregiver can focus on themselves, their mate, or other children. Lastly, attachment/affiliation is separated into two distinct systems: attachment motivational system and affiliative motivational system since affiliation may occur with others than the attachment figure alone. The five motivational systems were expanded to seven: physiological regulation, attachment, exploratory/assertive, aversive, sensual/sexual affiliation, and caregiving. The changing conceptualization of the motivational systems did not negatively affect the integrated model of human and place attachment. The addition of the caregiving motivational system may further strengthen the integration of place attachment into human attachment. The attachment figure is motivated by the caregiving system to encourage the child to explore the physical environment in order for the child to
achieve efficacy and become independent (see Figure 5-13). In other words, the attachment figure encourages autonomy. As discussed in detail earlier, autonomy was a meaningful variable for the cohort.

Figure 5-13: Modified “Integrated model of human attachment and place attachment” (Morgan, 2010, p. 15)

5.5 Conclusion: Autonomous Exploration and the Development of Judgement Skills

The agents of socialization influenced the cohort’s engagement with nature and the presence of nature influenced social interaction among the cohort. In the investigation of the bidirectional relationship, the nuance of autonomy surfaced as meaningful to the study cohort. As the cohort aged, their level of autonomy and home range increased. As the home range increased, the cohort continued to return to the creek. The portion of Cemetery Branch across from Conn ES seemed to serve as a secure base, much like the secure base function of human attachment relationships. From
an examination of the tripartite model of place attachment (Scannell & Gifford, 2010), the cohort seemed to have a strong place attachment to the creek.

Nature may be a crucial component in the formation of place attachment. Research suggests a connection between the presence of nature and place attachment. Korpela, Hartig, Kaiser, and Fuhrer (2001) interviewed university students about their favorite places in an effort to understand place attachment. Natural places represented the majority of responses for favorite places (48 responses of 101); only five responses of 98 mentioned natural places as unpleasant (Korpela et al., 2001). While investigating the place attachment of children living in New Mexico, Derr (2002) found that nature in addition to family and culture strengthened place attachment. Interestingly, Derr (2002) found an association with place attachment and human attachment, i.e., the influence of a significant family member on place attachment.
Chapter 6: Future Research

6.0 Place Attachment

The possible connection between human attachment and place attachment provides an interesting opportunity to better understand the outcomes of place attachment. If place attachment and human attachment are related concepts, then could the benefits enjoyed from secure human attachment extend to secure place attachment? Jack (2010) argues that for children who do not have the opportunity for secure human attachments or are separated from family, attachment to place may substitute for human attachment in promoting the health and well-being of children.

While human attachment is a well-studied and understood phenomenon, place attachment is not. The concept lacks a single name, e.g., place identity, sense of place, and a single definition. Little is known about the developmental and neurocognitive processes underlying place attachment. Also, the outcomes of secure place attachment are unknown.

6.1 The Influence of Nature

While nature plays a role in the formation of place attachment, it may not be essential for place attachment. In the cohort, nature inspired the behavior which assisted in the formation of secure place attachment; however, the necessity of nature is unclear. The cohort explored more urban areas with less nature present as they got older. Do they feel less securely attached to the abandoned warehouses of Downtown Raleigh than the portion of Cemetery Branch across Brookside Dr. from Conn ES? If so, then the strength of their place attachment may also be a product of duration. The cohort spent more years playing in the creek than in Downtown Raleigh. In order to create spaces which inspire secure place attachment, more information is needed about the physical characteristics of space which influence place attachment.
Chapter 7: Summary, Design Implications, and Limitations

7.0 Summary

In Chapter 1, the foundation was constructed for the grounded theory investigation. The theoretical perspective, probabilistic epigenesis, supported the possibility that the physical environment (nature) and social environment (socialization) influence development. In Chapter 2, the first literature review investigated the influence of socialization on engagement with nature, and the second review investigated the influence of nature on socialization, again operationalized as social interaction. In the literature reviews, an influence of autonomy was detected in both directions of the bidirectional relationship between nature and socialization. In Chapter 4, the findings of the dissertation research supported the existence of the bidirectional relationship between socialization and nature and a nuance of the bidirectional relationship was discovered: autonomy. Autonomy afforded the opportunity to attain efficacy in judgement skills. In Chapter 5, the nuance of autonomy was further investigated. Autonomy seemed to be a meaningful experience for the cohort in that their home range increased as they aged and their autonomy increased. From the findings, a pattern emerged which possibly associates human attachment with place attachment. Like the secure base function of human attachment relationships, the cohort seemed to regard the creek as a secure base in that exploration happened from the creek and the cohort returned for comfort. If place attachment and human attachment are related concepts, then perhaps children experience similar benefits of secure place attachment as they do from secure human attachment. In Chapter 6, future research was suggested investigating the concept of place attachment, possible benefits of place attachment, and the role of nature in the formation of secure place attachment.

7.1 Design Implications

Autonomy was an unexpected, meaningful experience of the cohort. The researcher expected the presence of nature to be meaningful, which was true but not to the extent of autonomy. In their autonomous exploration of the creek, the cohort encountered opportunities to attain an efficacy of judgement skills. For the study cohort, these managed risks, such as encountering wildlife and the homeless camping in the creek, allowed the study cohort to assess a situation, adjust
behavior accordingly, and gain efficacy in their judgement. This experience impacted their
development in that a desire to explore autonomously and confidence in their judgement ability were
evident in the interview data. Therefore, the importance of the physical environment as a context for
the development of autonomy and judgement was revealed.

In addition to caregivers granting autonomy, qualities of the physical environment facilitated
the cohort’s autonomous exploration. The wild vegetation that was still accessible, the changes in
topography, the presence of water, and the proximity to the school and homes were meaningful
characteristics of the physical environment which inspired the creation of the tribal society and
fostered autonomous exploration. For a time, this leftover space was for children. Once the adult
presence grew, benches were added. The increased presence of adults seemed to be detrimental to
the continuation of the tribal society since autonomy appeared to be meaningful for the study cohort.
Transforming the environment to be conducive to adults may have contributed to the decline of the
tribal society; cohort caregivers recognized that the play was not as creative when they were around.

Designers of the physical environment may influence development by utilizing these leftover
spaces to foster autonomous exploration. Proximity of natural areas near schools and homes
influenced the autonomous exploration of the study cohort. Safe passage was assured through the
presence of a crossing guard and sidewalk network. Contained by grade changes, vegetation, and
the surrounding urban fabric, the creek was a safe play for the cohort to play. The creek was
protected but still accessible. Until the benches arrived, the environment was not as conducive for
caregivers to linger for long periods of time, therefore the cohort enjoyed autonomy and the tribal
society flourished.

The presence of nature may support autonomy. Incorporating nature into the physical
environment may facilitate autonomous exploration. For example, incorporating nature in the urban
environment may facilitate a child’s opportunity for independent mobility.

While the cohort experienced independent mobility, interview data described something more
meaningful to the cohort and caregivers: autonomous exploration. In the integration of human and
place attachment, the capacity of the physical environment to motivate exploration is a key concept.
Perhaps, the design of green space in the urban environment needs to be considered as the design
of environments that have the potential to foster development and promote autonomy and decision making.

In the spectrum of play options for children, these wild, leftover places are not typically considered. Manufactured playgrounds and residential landscapes seem to be the most viable options for play. While these options are important, other options, specifically leftover spaces which encourage autonomous exploration should be considered.

7.2 Limitations

The main limitation of the research was the saturation of the data early in the process possibly due to the existence of the YouTube video. From the beginning, the video introduced the creek environment as the antithesis of the restrictive school environment where every minutia of the school day was perceived to be controlled. The creek represented freedom; a place that was not controlled by adults. All the cohort members viewed the video and their recollections of their time at the creek were framed by the video. The occurrence of autonomy in the interview narrative may be a product of the video instead of the lived experience. This possibility weakens the premise of autonomy as a nuance of the bidirectional relationship between socialization and nature. Follow-up interviews with the cohort once they begin families may be necessary. The level of autonomy they grant their children may illuminate the actual influence of autonomy in their childhood, i.e., rather autonomy is really meaningful or the focus of autonomy is a product of the YouTube video. Utilizing their status as agents of socialization by granting their children autonomy may add clarity to the role of autonomy in their own childhood.

Other explanations exist beyond the influence of the YouTube video. As discussed earlier, the influence of autonomy may also be attributed to the truth and/or peer comparison. Autonomy may actually be the most meaningful variable in the cohort’s childhood experience. In other words, the influence of autonomy was present in the interviews because to this cohort autonomy was truly the most meaningful variable. Also, as the cohort graduated Conn ES and attended different schools and universities, they compared their stories of their childhood experiences with peers and realized that they enjoyed a high level of autonomy.
The influence of the YouTube video may also be evident in the saturation of the data. In qualitative research, saturation happens when no significantly new information is gleaned from the data (Creswell, 2007). In reviewing the interviews, data saturation happened early in the interviewing process since no meaningful difference in the data occurred between the cohort members. In fact, the third interview was conducted so that the cohort represented a timeline of creek play. The saturation of the data may be attributed to the YouTube video framing the cohort’s reflection on this time in their lives. The video may also have sparked the cohort to discuss this experience before the interviews. Perhaps the saturation of the data may be attributed to the power of the shared experience. The cohort created an elaborate, highly social and cooperative tribal society at the creek while attending Conn ES. From this experience, the cohort forged long-term friendships which persist in spite of attending different middle and high schools and universities. The shared experience at the creek may be so powerful and meaningful as to account for the data saturation. In other words, the shared experience of playing at the creek may be meaningful to the cohort in similar ways evident in the long-term friendships.

Another limitation is the lack of similar cohorts playing in an urban creek. While the researcher discovered behavior traces of creek play in Raleigh, NC, no actual activity was observed; none were as frequent or as celebrated as the play in Cemetery Branch.
References


Footnotes

1Care farms in the Netherlands offer assistance to families with children who have behavioral issues or mental illness. Children stay at the farms for varying periods of time, a few nights to a week, in order to offer children support and guidance and caregivers a respite. Translated from: http://www.ojeeadhd.nl/ojd.php?p=algemene%20informatie.

2Matt misspoke when he stated, “This black man without his shirt come running up the street yelling at me to give me his bike” Before this section of the interview, Matt was talking about biking to school as early as second grade. The bike was Matt’s. The man was chasing Matt and trying to take Matt’s bike.
Appendices
Appendix 1.1: IRB Informed Consent for Caregivers

North Carolina State University
INFORMED CONSENT FORM for RESEARCH
PARENT

Title of Study: Play behavior and place interviews (adults), Raleigh, NC
Principal Investigator: Sarah Little, MLA, RLA
Faculty Sponsor (if applicable): Art Rice

What are some general things you should know about research studies?
You are invited to take part in a research study. Your participation in this study is voluntary. Therefore you have the right to be a part of this study, to choose not to participate or to stop participating at any time without penalty. The purpose of this study is to evaluate the play environments in an urban environment and the associated behaviors and outcomes. You are not guaranteed any personal benefits from being in a study. In this consent form you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form it is your right to ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If at any time you have questions about your participation, do not hesitate to contact the researcher(s) named above.

What is the purpose of this study?
The purpose of this study is to understand the role of nature in the choice of play environments in the Oakwood/Mordecai neighborhoods in Raleigh, NC.

What will happen if you take part in the study?
An interview will be conducted where you answer questions pertaining to your play experiences as a child and what are the factors that influence where you allow your child to play within your neighborhood.

Risks
No potential risks are foreseen.

Benefits
There is the likelihood that parents will benefit indirectly from the information imparted about the importance of nature in children’s daily lives.

Confidentiality
Personal or sensitive information about you will not be requested (e.g. private behavior, economic status, sexual issues, religious beliefs, or other personal matters).

Compensation
You will not receive monetary compensation for the involvement in the study.

What if you are a NCSU student?
Participation in this study is not a course requirement and your participation or lack thereof, will not affect your class standing or grades at NC State.

What if you have questions about this study?
If you have questions at any time about the study or the procedures, you may contact the researcher as follows: 
- Sarah Little, PhD student, NCSU, Raleigh, NC; selittle@ncsu.edu; 980.721.0420

What if you have questions about your rights as a research participant?
If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Deb Paxton, Regulatory Compliance Administrator, Box 7514, NCSU Campus (919/515-4514).

Consent to Participate:
“I have read and understand the above information, I have received a copy of this form. I agree my child to participate in this study with the understanding that he/she may choose not to participate or to stop participating at any time without penalty or loss of benefits to which he/she is otherwise entitled.”

Subject’s signature________________________________________ Date____________________

Investigator’s signature____________________________________ Date____________________
Appendix 1.2: IRB Informed Consent for Emerging Adults

North Carolina State University INFORMED CONSENT FORM for RESEARCH PARENT

Title of Study: Play behavior and place interviews (adults), Raleigh, NC
Principal Investigator: Sarah Little, MLA, RLA

What are some general things you should know about research studies?
You are invited to take part in a research study. Your participation in this study is voluntary. Therefore you have the
right to be a part of this study, to choose not to participate or to stop participating at any time without penalty. The
purpose of this study is to evaluate the play environments in an urban environment and the associated behaviors and
outcomes. You are not guaranteed any personal benefits from being in a study. In this consent form you will find
specific details about the research in which you are being asked to participate. If you do not understand something in
this form it is your right to ask the researcher for clarification or more information. A copy of this consent form will be
provided to you. If at any time you have questions about your participation, do not hesitate to contact the
researcher(s) named above.

What is the purpose of this study?
The purpose of this study is to understand the role of nature in the choice of play environments in the
Oakwood/Mordecai neighborhoods in Raleigh, NC.

What will happen if you take part in the study?
An interview will be conducted where you answer questions pertaining to your play experiences as a child playing in
Cemetery Branch and other areas of Raleigh, NC.

Risks
No potential risks are foreseen.

Benefits
You will get an opportunity to reminisce about your childhood and share your stories with me.

Confidentiality
I will ask you personal questions, but your privacy will be protected. Audio files will be saved utilizing a
naming system which cannot be identified with you. Also, a transcript of the interview will be stored in a fire safe
box in my house and will be destroyed at the end of the project.

Compensation
You will not receive monetary compensation for the involvement in the study.

What if you are a NCSU student?
Participation in this study is not a course requirement and your participation or lack thereof, will not affect your
class standing or grades at NC State.

What if you have questions about this study?
If you have questions at any time about the study or the procedures, you may contact the researcher as follows:
• Sarah Little, PhD student, NCSU, Raleigh, NC, slittle@ncsu.edu; 980.721.0420

What if you have questions about your rights as a research participant?
If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in
research have been violated during the course of this project, you may contact Deb Paxton, Regulatory Compliance
Administrator, Box 7514, NCSU Campus (919/515-4514).

Consent to Participate:
"I have read and understand the above information. I have received a copy of this form. I agree my child to participate
in this study with the understanding that he/she may choose not to participate or to stop participating at any time
without penalty or loss of benefits to which he/she is otherwise entitled."

Subject’s signature ___________________________ Date ___________________________
Investigator's signature ___________________________ Date ___________________________
## Appendix 1.3: Results of Literature Review 1

<table>
<thead>
<tr>
<th>Article</th>
<th>n</th>
<th>ART</th>
<th>SRT</th>
<th>Mean Age</th>
<th>Restoration Outcomes</th>
<th>Recovery Outcomes</th>
<th>Solitary</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>36</td>
<td>Yes</td>
<td>Yes</td>
<td>1.5-3</td>
<td>Direct attention</td>
<td>Stress</td>
<td>Unknown</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Social interaction</td>
<td>Social interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>172</td>
<td>Yes</td>
<td>No</td>
<td>11.3</td>
<td>n/a</td>
<td>Stress</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>452</td>
<td>Yes</td>
<td>No</td>
<td>5-18</td>
<td>Severity of ADHD/ADHD symptoms as assessed by parents</td>
<td>n/a</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>198</td>
<td>Yes</td>
<td>Yes</td>
<td>4.5-6.5</td>
<td>Attention</td>
<td>n/a</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hyperactivity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Impulsive control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>36</td>
<td>Yes</td>
<td>Yes</td>
<td>11</td>
<td>n/a</td>
<td>Mood (energy, hedonic tone, stress, and anger)</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Projects (engagement, control, stress, efficacy, and challenge)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>17</td>
<td>Yes</td>
<td>No</td>
<td>7-12</td>
<td>Concentration</td>
<td>n/a</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>421</td>
<td>Yes</td>
<td>No</td>
<td>5-18</td>
<td>Severity of ADHD/ADHD symptoms as assessed by parents</td>
<td>n/a</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>56</td>
<td>Yes</td>
<td>No</td>
<td>10-11</td>
<td>Attentional functioning</td>
<td>n/a</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>17</td>
<td>Yes</td>
<td>Yes</td>
<td>7-17</td>
<td>Directed attention capacity</td>
<td>n/a</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>337</td>
<td>Yes</td>
<td>No</td>
<td>8.2</td>
<td>n/a</td>
<td>Stress</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Psychological Distress</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>337</td>
<td>Yes</td>
<td>No</td>
<td>9-17</td>
<td>Perception of restorativeness</td>
<td>n/a</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Concentration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Appendix 1.4: Results of Literature Review 2

<table>
<thead>
<tr>
<th>Article</th>
<th>Occurrences of Social Domain Relationships (CAREGIVERS)</th>
<th>Occurrences of Social Domain Relationships (PEERS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attachment</td>
<td>Hierarchical</td>
</tr>
<tr>
<td>1</td>
<td>Bixler &amp; Morris, 2000</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Bixler et al., 2011</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Chawla, 2007</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Cheng &amp; Monroe, 2012</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Evans et al., 2007</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Farmer et al., 2011</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Guiney &amp; Oberhauser, 2009</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>Hordyk et al., 2015</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>James et al., 2010</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Jansson, 2008</td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>Karsten &amp; van Vliet, 2006</td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>Rice &amp; Torquati, 2013</td>
<td>-</td>
</tr>
<tr>
<td>13</td>
<td>Ridgers et al., 2012</td>
<td>-</td>
</tr>
<tr>
<td>14</td>
<td>Skar &amp; Krogh, 2009</td>
<td>-</td>
</tr>
<tr>
<td>15</td>
<td>Vadala et al., 2007</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Totals</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Percentages</td>
<td>16%</td>
</tr>
</tbody>
</table>
## Appendix 1.5: Results of Literature Review 3

<table>
<thead>
<tr>
<th>Article</th>
<th>n</th>
<th>Country</th>
<th>Participants</th>
<th>Mean Age or Range</th>
<th>Method</th>
<th>Fosters Positive SI</th>
<th>Affords SP / CP</th>
<th>Supports Autonomy</th>
<th>Affords Opportunity</th>
<th>Social Ties</th>
<th>Reduces Aggression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrus et al., 2012</td>
<td>16</td>
<td>Italy</td>
<td>Preschool students</td>
<td>1.5-3</td>
<td>Observation</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chawla et al., 2014</td>
<td>169</td>
<td>US</td>
<td>(2) elementary schools Students, teachers, parents, alumni</td>
<td>varies</td>
<td>Observation (children) Interview</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dutt, 2012</td>
<td>42</td>
<td>Canada</td>
<td>Elementary school students</td>
<td>unknown</td>
<td>Interview</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fjørtoft, 2004</td>
<td>75</td>
<td>Norway</td>
<td>Kindergarten class</td>
<td>5-7</td>
<td>Observation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hordyk, Hanley, &amp; Richard, 2015</td>
<td>23</td>
<td>Canada</td>
<td>Immigrant families enrolled in a welcome class through school</td>
<td>7-13</td>
<td>Interview</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jansson, 2008</td>
<td>141</td>
<td>Sweden</td>
<td>Children from (2) Swedish communities</td>
<td>6-11</td>
<td>Interview</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kuo &amp; Sullivan, 2001</td>
<td>145</td>
<td>US</td>
<td>Public housing residents</td>
<td>34</td>
<td>Interview Greenness scale</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lindemann-Matthies &amp; Knecht, 2011</td>
<td>257</td>
<td>Switzerland</td>
<td>Elementary school teachers</td>
<td>43</td>
<td>Interview, observation, and questionnaire</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malone &amp; Tranter, 2003</td>
<td>50</td>
<td>Canada</td>
<td>Elementary school</td>
<td>8-10</td>
<td>Interview Behavior mapping</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O'Brien &amp; Murray, 2007</td>
<td>24</td>
<td>Britain</td>
<td>Forest schools</td>
<td>3.2-9</td>
<td>Observation Interview</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owens &amp; McKinnon, 2009</td>
<td>58</td>
<td>US</td>
<td>Youth serving collaborative</td>
<td>13-20</td>
<td>Photo voice</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeland, Dubendorfer, &amp; Hansmann, 2009</td>
<td>461</td>
<td>Switzerland</td>
<td>Swiss and foreign pupils (437) Teachers (24)</td>
<td>13.1</td>
<td>Interview Questionnaire</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sullivan, Kuo, &amp; DePooter, 2004</td>
<td>758*</td>
<td>US</td>
<td>Public housing residents</td>
<td>n/a</td>
<td>Observation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Sullivan et al., 2004 used 758 observations, not participants

Note: SI = social interaction, SP = social play, and CP = cooperative play