GROWING MINDS:

THE RELATIONSHIP BETWEEN PARENTAL ATTITUDE ABOUT NATURE AND THE DEVELOPMENT OF FINE AND GROSS MOTOR SKILLS IN CHILDREN

A Dissertation

by

AMY LENE' MCFARLAND

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2011

Major Subject: Horticulture

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Approved by:

Chair of Committee,	Jayne M. Zajicek
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ABSTRACT

Growing Minds:

The Relationship Between Parental Attitude about Nature and

the Development of Fine and Gross Motor Skills in Children.

(May 2011)

Amy Lene' McFarland, B.A., Rice University; M.Ed., Texas State University

Chair of Advisory Committee: Dr. Jayne M. Zajicek

Adults associate their childhood with playing outdoors, often in natural settings. This type of free play is valuable to child development. Children tend to use outdoor play areas in physically active ways, and time spent outdoors relates positively to increased physical activity in children. However, children today are spending an increasing amount of time indoors rather than outdoors. Recent research has shown that the amount of time children spend in outdoor play is directly related to parental concerns about their children's exposure to outdoor hazards. The purpose of this project was to investigate the relationship between parental attitude toward nature and the development of fine and gross motor skills in young children. The sample for this study was drawn from parents of children ages 3 to 5 years old enrolled at one of two University Child Development Centers. The assessment tool used was composed of sections that ask parents about their attitudes toward nature, about their young children spending time outdoors, how much time their children actually spend in outdoor and indoor activities,

and standard demographic questions. The childcare centers independently assessed children's motor development. Statistical comparisons included correlations and ANOVA.

Results from this study indicated that parents had positive views toward nature and towards their child's outdoor recreation. Parents who had more positive views toward nature also tended to have more positive views toward their child's outdoor recreation. Children who participated in certain indoor activities tended to score higher in the area of fine motor skills. However, children who spent more time indoors in free play had lower gross motor skill scores. Parents who scored better on the Parental Attitude toward Their Child's Outdoor Recreation scale reported that their child spent more time in outdoor free play and outdoor organized sports and activities. Parents preferred outdoor play spaces when compared to indoor play spaces and specifically those outdoor spaces that were constructed with more nearby natural components.

DEDICATION

This dissertation is dedicated to my family whose constant support of my educational goals means more to me than I can express. I am especially grateful to my mother, whose life struggles and perseverance has been a constant source of inspiration.

ACKNOWLEDGEMENTS

I would like to thank my committee chair, Dr. Zajicek, and my committee members, Dr. Cade, Dr. Lineberger, Dr. Lindner. To Dr. Z and Dr. Cade: as women, you two are an incredible inspiration and source of encouragement. Without the two of you, I probably would not have come back to school, much less been able to finish! I want to extend a special thanks to Dr. Cade for her patience, persistence, and continuous guidance throughout this process, and the support I know you will continue to offer in the coming years as I start my career in academia.

Thanks also go to my friends and colleagues and the department faculty and staff for making my time at Texas A&M University a great experience. I also want to extend my gratitude to the Becky Gates Children's Center and the Texas State University Child Development Center directors and staff who put up with my constant emails and visits. I hope I wasn't too much of a hassle! Thanks also go to the families who were willing to participate in the study.

Finally, thanks to my parents and grandparents for their encouragement and to Scott for his patience, love, and help.

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CHAPTER I

INTRODUCTION

Within the space of a few decades, the way children understand and experience nature has radically changed.... Today, kids are aware of the global threats to the environment—but their physical contact, their intimacy with nature, is fading. That's exactly the opposite of how it was when I was a child.

Richard Louv (2008, p. 1)

Many adults associate their childhood with playing outdoors, most often in natural settings, including playgrounds, gardens, and parks (Francis, 1995). Children today do not share this childhood experience with their parents. They are spending an increasing amount of time indoors rather than outdoors (Karsten, 2005; Tranter and Doyle, 1996). In a study asking mothers to recall their childhood and to compare that to their children, 70% of mothers reported playing outside on a daily basis, but only 31% of their children did so (Clements, 2004). Finally, 85% of the respondents to this study agreed their children spent less time outdoors than they did as a child (Clements, 2004). A different study found that only 18% of children participated in outdoor activities. Alternatively, 97% of children spent time watching television indoors (Hofferth and Sandberg, 2001).

Kaplan (1992) defined nature to include "one plant or many plants, and also the place created by them. It includes a street tree as well as trees in an atrium. We also

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This dissertation follows the style of HortTechnology.

include in this concept nearby fields, woods and land that have not yet been turned to development" (p. 126). People can interact with plants and nature either actively or passively. Lewis (1994) explained that both types of interactions with natural areas have positive mental and physical effects on individuals. Kaplan (1992) explained that research has found such effects to be global, and not bound by culture, ethnicity, age, place of residence, or occupation.

Individuals engaged in active interactions are "intimately involved with the plants being grown and directly responsible for the well-being of the plants" (Lewis, 1992, p. 57). Gardening, for example, is one such active interaction. Research has shown that active interactions with nature were related to improved psychological and physiological health, including increased self-esteem and reduced stress levels (Cammack et al., 2002; Kaplan, 1973; Lewis, 1978; Waliczek et al., 2005).

Alternatively, passive interactions have included those that are visual and more observational in character. MacKay (1990) described passive interactions as when the "user interacts subconsciously with the landscape when using or moving within its masses and spaces" (p. 113). The mere presence of plants have been found to "improve[s] the quality of our lives in many ways: environmentally, economically, socially, culturally and physically through our health and well-being" (Zampini, 1994, p. 185).

Research has produced a small but interesting set of studies that investigated the effects of passive interactions with nature. Kaplan and Kaplan (1989) reported, "People with access to nearby natural settings have been found to be healthier overall than other

individuals. The longer-term, indirect impacts (of 'nearby nature') also included increased levels of satisfaction with one's home, one's job and with life in general" (p. 173). With findings that indicated a relationship between the physical environment and affect, researchers have concluded, "These studies demonstrate that human responses to vegetation are not merely aesthetic; they are affective and cognitive as well. Vegetation can make people feel better" (Sheets and Manzer, 1991, p. 302).

Studies in the field of people/plant interactions have also focused on these interactions and the impacts they can have on children (Dresner and Gill, 1994; Davies and Cohen, 1995; Heerwagen, 1990; Moritari, 2000; Taylor et al., 2002; Ulrich, 1984; White and Heerwagen, 1998). Dresner and Gill (1994) investigated the effects of an environmental education program at a summer nature camp. At this camp, children spent time hiking, observing wildlife including elks, birds, otters, and other animals, and backpacking. Through this camp, the researchers found not only an increase in environmental awareness and concern, but also an increase in curiosity and eagerness, a decreased interest in television, and an improvement in self-esteem (Dresner and Gill, 1994).

Another study investigated the effects of a similar camp on teenagers at risk for drug abuse (Davies and Cohen, 1995). As a part of this camp, students were required to participate in various activities outdoors in a natural environment. The researchers found decreased scores on a depression inventory, decreased drug use, and an improvement in self-esteem after participation in this camp (Davies and Cohen, 1995). Furthermore, Moritari (2000) found that when young urban children were repeatedly

exposed to natural spaces, they learned to appreciate quiet time and self-reflection, and that their world view of what constituted a good quality of life changed to be less focused on material objects.

Taylor et al. (2002) found that green space immediately outside the home helped female inner city children score more positively on measures of concentration, inhibition of impulses, and delay of gratification. However, these findings did not apply to male children in the study. Additonally, Wells and Evans (2003) found that children with more nearby nature felt less of an impact from life stress than children with less nearby nature. Finally, Wells (2000) found that children who moved from homes with few natural elements to homes with more natural elements experienced an increase in the ability to direct their attention, and that those children who experienced the greatest change in nearby natural elements experienced the greatest increase in the ability to concentrate.

Unfortunately, recent research focusing on how children spend their time (Hofferth and Sandberg, 2001) has pointed out that many American kids are spending significant amounts of time in sedentary activity (Pellegrini and Smith, 1998). Research indicates that many adults associate their childhood with playing outdoors, most often in natural settings, including playgrounds, gardens, and parks (Francis, 1995). However, children today are spending an increasing amount of time indoors rather than outdoors (Karsten, 2005; Tranter and Doyle, 1996); research found that children under the age of 13 spent only about 30 minutes a week in outdoor activities with only 18% of children participating in outdoor activities. Alternatively, 97% of children spent time watching

television indoors, with an average of 12 hours spent per week on this indoor activity (Hofferth and Sandberg, 2001). Time spent in outdoor activities versus indoor activities has been shown to affect dietary habits, calorie intake (Blass et al., 2006; Coon et al., 2001; Lautenschlager and Smith, 2007), obesity and body mass index (Ludvigsson et al., 2007; Proctor et al., 2003) because people eat more while indoors. In addition, illnesses (Watanabe et al., 2006) such as asthma and allergies (Dimich-Ward et al., 2006; Halken, 2003; Ring et al., 2001; Squillace et al., 1997) have increased due to a lack of exposure to and immunity to allergens.

Research has found that free play, both indoor and outdoor, is valuable to child development (Bredekamp and Copple, 1997; Larson and Verma, 1999). Research has shown that when children were taken to an outdoor play area, children tended to use the area in physically active ways (Farley et al., 2007), and that time spent outdoors related positively to increased physical activity in children as young as pre-schoolers (Klesges et al., 1990; Sallis et al., 1993). Some recent research has shown that the amount of time children spend in outdoor play was directly related to parental concerns of their children being exposed to traffic, strangers, injuries, and other outdoor hazards (Burke, 2005; Carver, et al., 2008; Rivkin, 2000; Valentine and McKendrick, 1997).

Not only has research shown that outdoor play in general is beneficial to the physical development of children, recent research has found that children using forest or natural areas as playscapes performed better on motor skill tests when compared to children playing on traditional playgrounds (Fjortoft, 2001). Furthermore, in a study asking Canadian schools to evaluate the greenness of their playscapes and the physical

activity of the students, researchers found that schools that reported more green elements also reported more physical activity among students when compared to schools who reported fewer green elements such as trees, rocks, flowers, and water features (Dyment and Bell, 2007).

Recent research has suggested that early motor function and sensory experiences are crucial to brain and motor development (Greenough and Black, 1992; Shatz, 1992). These studies have identified critical periods during which these kinds of experiences have the greatest effects. The general critical period for gross motor development seems to be from birth to age five, with finer motor skill development being extended to age nine (Chugani, 1998).

Statement of Purpose and Objectives

The purpose of this research project was to investigate the relationship between parental attitude toward nature and the development of fine and gross motor skills in young children.

Objectives

The specific objectives of this study were:

1. To investigate parental attitude toward nature.
2. To investigate parental attitude toward their child's outdoor recreation.
3. To investigate the relationship between parental attitude toward nature and parental attitude toward their child's outdoor recreation.

4. To investigate the relationship between the amounts of time spent in outdoor activities and the development of fine and gross motor skills in young children.
5. To investigate the relationship between time spent in various activities with parental attitudes toward nature and attitude toward their child's outdoor recreation.
6. To investigate the relationship between parental attitude toward their child's outdoor recreation and the development of fine and gross motor skills in their children.
7. To compare parental preferences for play areas based on the natural and artificial elements of the setting.

The following hypotheses were tested:

H1: Parents who have positive attitudes toward nature will have more positive attitudes toward their child's outdoor recreation.

H2: Children whose parents have more positive attitudes toward their outdoor recreation will have better scores on fine and gross motor skills tests.

Definition of Terms

For the purpose of this study, the following terms were operationally defined:

Motor: "the neuromuscular or other nonobservable internal processes or traits assumed to affect movement behavior" (Greenwood et al., 2002).

Movement: "the observable behaviors involved in a change of posture or locomotion" (Greenwood et al., 2002)

Basic Assumptions

1. It was assumed that participants considered each survey question and answered honestly without bias.
2. It was assumed that the population sample was representative of the target sample.

Limitations

1. Human subjects research has extraneous factors all of which cannot be controlled for which may influence the results of this study.
2. Correlational research cannot control for all variables and cannot manipulate independent variables, and therefore cannot determine causation.
3. This study was limited by the motor development observational methods already in use by the childcare centers, which limited the variation in scores.
4. This study was limited to those parents willing to respond to the survey.

Delimitations

1. This study was delimited to parents of children ages 3 to 5 years old.
2. This study was delimited to parents of children enrolled at one of two university child care centers.

CHAPTER II

REVIEW OF LITERATURE

Research has found that free play, both indoor and outdoor, is valuable to child development (Bredekamp and Copple, 1997; Larson and Verma, 1999). Mothers, too, recognize the value of outdoor play to their children (Clements, 2004). However, recent research reported that the amount of time children spend in outdoor play was directly related to parental concerns of their children being exposed to dangers such as traffic, strangers, injuries, and other outdoor hazards (Burke, 2005; Carver et al., 2008; Rivkin, 2000; Valentine and McKendrick, 1997).

The purpose of this research project was to investigate the relationship between parental attitude toward nature and the development of fine and gross motor skills in young children. The following literature review will investigate research-based findings on how children develop, when children develop, and how impeding outdoor playtime, or even encouraging indoor playtime, can have wide-reaching detrimental effects on children.

The Development of Fine and Gross Motor Skills in Children

Arnold Gesell was an early theorist who developed much of the current thought guiding contemporary research on childhood physical development (Dalton, 2005). While most of his work was observational in nature, much of it has been addressed experimentally by his successors in developmental science (Dalton, 2005).

Much of Gesell's work was criticized as being a simplistic view of childhood development (Dalton, 2005). Gesell's observations with infants born pre-maturely led

him to believe that the majority of a child's development is based on genetics. Since pre-mature babies who were born without other complications did not necessarily display delayed development, their development rates must be hard-wired, Gesell believed. While Gesell agreed that the environment can support development, he was adamant that the environment did not progress or shape development in children (Dalton, 2005; Gesell and Thompson, 1934). Gesell's work established specific timetables, which he believed were normative and could be applied as defining standard motor development in young children (Bushnell and Boudreau, 1993).

Myrtle McGraw, another instrumental developmentalist, studied the determinants of the standards Gesell revealed in the development of fine and gross motor skills in children (Bushnell and Boudreau, 1993). Research by McGraw (1943) and Gesell and Thompson (1938) led early developmentalists to theorize that the onset motor skills were a derivative of some unseen development within the mind. In other words, specific abilities in the mind dictated and preceded specific motor abilities (Bushnell and Boudreau, 1993). This "maturational perspective" argued that development was biologically inborn (Gallahue and Ozmun, 2002).

Swiss psychologist Jean Piaget also provided much insight used by contemporary researchers regarding child development (Bruner, 1996). While Piaget focused on cognitive and not motor development, many current researchers recognized the interconnectivity and inter-influential nature of each area of development (Nuttal et al., 1999). Motor development is recognized as one of most necessary areas of development, and is considered essential before other areas of childhood development

can proceed (Bushnell and Boudreau, 1993; Greenwood et al., 2002). Piaget recognized that the environment in which children developed played a substantial role in their overall development. He believed that children needed to be provided with opportunities in the environment to experience problem-solving, play, curiosity, and imitation (Piaget, 1954). Bushnell and Boudreau (1993) found that the onset of certain motor development skills were prerequisites for corresponding perceptual abilities. In other words, if a child did not develop certain motor skills, certain perceptual abilities were delayed until those motor skills were developed, or until those skills were obtained in some other way (Bushnell and Boudreau, 1993).

Developmental and environmental psychologist Anita R. Olds stated, "Movement and action are essential to children's development in general and to intellectual development in particular" (1994, p. 32). She further noted that experience in the natural world was essential for motor development (Olds, 1994).

Research conducted after Gesell's death showed that pre-mature infants did, in fact, have a higher risk for motor delays when compared to full-term infants (Ross, 1985; Saigal et al., 1982; Ungerer and Sigman, 1983). Thus, researchers recognized that a wide array of factors influenced motor development (Jeng et al., 2000; Kamm et al., 1990; Thelen et al., 1993) and that children needed opportunities to use large muscles in order to develop gross motor skills (Hendrick and Weissman, 2009).

One theory, known as "dynamic systems," was based on the work of Nicholas Bernstein (1967) and recognized the interplay of various factors in overall child development including the constraints of the physical environment (Jeng et al., 2000;

Kamm et al., 1990; Thelen et al., 1993). This theory explained that development is not linear or sequential, but is discontinuous (Gallahue and Ozmun, 2002). Thelen et al. (1993) suggested that motor skills were actually "discovered" (p. 1089) as children explored their environment. It was suggested that motor skills in elementary age children are directly related to the number of opportunities they have had to develop them through a range of various activities such as "throwing, catching, kicking, and running" (Bunker, 1991, p. 468). A similar effect was found in mice with brain disorders such as Alzheimer's disease and Parkinson's disease in a laboratory study (Nithianantharajah and Hannan, 2006). By enhancing the living conditions of these animals with heightened sensory, cognitive, and motor stimulation, disease progression, and motor deterioration were delayed (Nithianantharajah and Hannan, 2006). This laboratory study on animals, and the observations made by developmentalists all suggested that the environment plays a key role in motor development and the maintenance of motor skills.

Although the development of fine and gross motor skills in children has been researched since the 1920's with researchers such as Gesell (Gesell and Thompson, 1934), McGraw (1943), and Piaget (1954), it is currently recognized that research in this area is confounded by numerous variables. While developmentalists may standardize timetables for motor skills, these skills do not just appear fully formed. Instead, they develop gradually over time (Fischer and Bidell, 1993). Due to this unfolding of motor skills, investigating precursors, prerequisites, and determinants are not an exact science (Bushnell and Boudreau, 1993). Furthermore, although researchers separate the

different developmental areas such as motor, cognitive, social, and emotional, they are actually inseparable and each area influences the others (Nuttal et al., 1999).

Early motor function and sensory experiences are crucial to brain and motor development (Chugani, 1998; Glaser, 2000; Greenough and Black, 1992; Olds, 1994, Shatz, 1992). In fact, research on children who are victims of child abuse and neglect reported structural changes in the brain that are due to environmental adversity, and that this effect of abuse was mediated by early permanent changes such as alternative caregivers (Glaser, 2000). Furthermore, learning disabilities may be preceded by motor development problems (Olds, 1994). Critical periods were identified during which these kinds of experiences had the greatest effects (Chugani, 1998). The general critical period for gross motor development was reported to be from birth to age 5, with finer motor skill development being extended to age 9 (Chugani, 1998).

It is at approximately age 3 that children experience the most physical growth and develop the most valuable gross motor skills necessary for their overall development (Cooper et al., 1999; Janz et al., 2000; Kalish, 1995; Noland et al., 1990). Myelination of the nervous system completes during this age period and may be why it is critical for motor development (Gallahue and Ozmun, 2002). Myelination allows for the transmission of nerve impulses from various areas of the body to the brain, which leads to greater control and more complex movement (Gallahue and Ozmun, 2002).

Current research further suggested that environmental factors on child development have the greatest impact during the first several years of life (Bradley et al., 2001; Ramey and Ramey, 1998).

Impact of Poor Motor Development

Poor motor development and coordination have extensive impacts on children, both during their childhood and into their adult lives. Adequate development of fine and gross motor skills is invaluable to the overall development of a child and can have "profound effects on the development of cognitive and social behaviors throughout the lifespan" (Payne and Isaccs, 1995, p. 13).

Research reported that poor motor development was linked to attention disorders in children (Dewey et al., 2002; Gillberg and Gillberg, 1983; Gilberg et al., 1989; Piek, et al., 1999; Pitcher et al., 2003). For example, males with attention deficit/hyperactivity disorder had significantly poorer fine and gross motor ability when compared to males without ADHD (Pitcher et al., 2003). Longitudinal studies reported that poor motor control and attention disorders persisted into and continued to have an impact during the teenage years and adulthood (Gillberg et al., 2004; Hellgren et al., 2008).

Other research on poor motor skill development linked poor motor control to low self-esteem (Henderson, et al., 1989; Losse et al., 1991; Maeland 1992; Piek et al., 2000; Piek et al., 2006; Schoemaker and Kalverboer, 1994, Skinner and Piek, 2001). For example, Skinner and Piek (2001) found that children with poorer motor development reported lower feelings of self-worth on self-evaluation measures when compared to children with greater motor control (Skinner and Piek, 2001). Schoemaker and Kalverboer (1994) explained that these feelings may be found in children as young as 6 years old. They further reported that these children who have poorer motor control experienced anxiety when they anticipated physical activity which often led them to

withdraw from the activity and closed opportunities for further motor development (Schoemaker and Kalverboer, 1994).

Additional research linked poor motor development to lower educational achievement (Dewey et al., 2002; Gillberg and Gillberg, 1983; Kadesjo and Gillberg, 1999; O'Dwyer, 1987). For example, Dewey et al., (2002) reported that children in Canada with poor motor coordination scored statistically significantly lower scores on learning measures that included reading, writing, and spelling when compared to children without motor coordination problems. Kadesjo and Gillberg (1999) reported children with motor development also had problems with reading comprehension. Other research reported that children with learning disorders such as dyslexia tended to have high rates of motor difficulties (Dewey et al., 2000; Fawcett and Nicolson, 1994; Fawcett and Nicolson, 1995; Gottesman et al., 1984; Nicolson and Fawcett, 1994).

Furthermore, research reported that children with motor difficulties also had social issues and problems relating to other children (Bouffard et al., 1996; Chen and Cohn, 2003; Dewey et al., 2000; Gubbay, 1975; Schoemaker and Kalverboer, 1994; Skinner and Piek, 2001; Smyth and Anderson, 2000). A British study reported that children who scored poorly on movement tests spent their time differently in the playground when compared to children who did not score poorly on the same movement tests (Smyth and Anderson, 2000). Smyth and Anderson (2000) noted that the low scoring children, both boys and girls, spent more time alone or with just one other child and less time in structured group play with other children when compared to those who scored better on the movement tests. Similarly, a Canadian study found that parents of

children with poor motor development reported more instances of social problems when compared to the reports of parents of typically developing children (Dewey et al., 2002). After reviewing the literature on the concurrence of motor development delay and social problems in children, Chen and Cohn (2003) stated that, "enhancing social participation in children with DCD [developmental coordination disorder] is a primary goal of intervention" (p. 70).

Importance of Outdoor Play

Piaget was one of the earliest theorists who recognized the value of play in children (Piaget, 1962). Bunker (1991) stated, "Play is perhaps one of the most important aspects of a young child's life. In the early years, children must use movement to learn about their world. They move to learn, and they also learn to move" (p. 467). Burdette and Whitaker (2005) defined play as "the spontaneous activity in which children engage to amuse and to occupy themselves" (p. 46). They further stated that outdoor play is irreplaceable in providing young children with the opportunity and free range to develop and explore gross motor skills (Burdette and Whitaker, 2005). Piaget also recognized that children's play enhanced physical, intellectual, emotional, conceptual, and social development (Piaget, 1962).

Research found that free play, both indoor and outdoor, is valuable to child development (Bredekamp and Copple, 1997; Larson and Verma, 1999). Outdoor environments are thought to encourage higher levels and more frequent physical activity than indoor environments (Klesges et al., 1990). Research has shown that when children were taken to an outdoor play area, children tended to use the area in physically active

ways (Farley et al., 2007), and that time spent outdoors related positively to increased physical activity in children as young as pre-schoolers (Klesges et al., 1990; Sallis et al., 1993). It is important to understand that physical activity is not necessarily related to motor development, because as children grow from being toddlers to adolescents their motor skills improve while their physical activity decreases (Sallis et al., 1992). While there are age confounds in the comparison of physical activity levels and motor development, research has found that children who were more active, regardless of if this activity occurred through the course of organized sports or through leisurely play, have better gross motor development when compared to children of the same age who are less active (Graf et al., 2004). Conversely, this same study reported that children who reported more television viewing had poorer gross motor development (Graf et al., 2004).

Mothers, too, recognized the value of outdoor play for their children's motor skill development (Clements, 2004). Clements (2004) found that 93% of mothers agreed that outdoor play helps their children develop motor skills. However, recent research reported that the amount of time children spend in outdoor play is directly related to parental concerns of their children being exposed to dangers such as traffic, strangers, injuries, and other outdoor hazards (Burke, 2005; Carver, et al., 2008; Rivkin, 2000; Valentine and McKendrick, 1997). Olds (1994) warned against constraining movement for reasons such as urbanization and overprotective caregivers, stating that preventing risks "retard and prejudice any child's chances for a positive developmental outcome" (p. 33). It may be even more important to promote outdoor play and movement in young

girls because as girls reach grades 6 and beyond, they have lower enrollment rates in organized sports and fewer hours of physical and strenuous activity when compared to boys (Vilhjalmsson and Kristjansdottir, 2003).

Not only has research shown that outdoor play in general is beneficial to the physical development of children, recent research found that children using forest or natural areas as playscapes performed better on motor skill tests when compared to children who played on traditional playgrounds (Fjortoft, 2001). Bagot (2005) explained a Swedish study that found children who attended a preschool center with a naturalistic landscape surrounded by an orchard had better motor development when compared to children who attended an urban preschool center (Grahn et al., 1997). Psychologist Karen Bagot (2005) stated, "Green play settings are consistently associated with stronger developmental benefits to children when specifically compared to built play settings" (p. 15).

Research not specifically related to outdoor play and motor skill development may also reveal a positive relationship between the two occurrences. For example, outdoor play and contact with nature significantly reduced symptoms of attention deficit disorder in diagnosed children (Taylor et al., 2001; Kuo and Taylor, 2004). This reduction in symptoms from outdoor play may be important as males with attention deficit/hyperactivity disorder also have significantly poorer fine and gross motor ability when compared to males without ADHD (Pitcher et al., 2003).

People/Plant Interactions

Kaplan (1992) defined nature to include "one plant or many plants, and also the place created by them. It includes a street tree as well as trees in an atrium. We also include in this concept nearby fields, woods and land that have not yet been turned to development" (p. 126). People can interact with plants and nature either actively or passively. Lewis (1994) explained that both types of interactions with natural areas had positive mental and physical effects on individuals. Kaplan (1992) explained that research has found such effects to be global, and not bound by culture, ethnicity, age, place of residence, or occupation.

Individuals engaged in active interactions are "intimately involved with the plants being grown and directly responsible for the well-being of the plants" (Lewis, 1992, p. 57). Research has shown that active interactions with nature were related to improved psychological and physiological health, including increased self-esteem and reduced stress levels (Cammack et al., 2002; Kaplan, 1973; Lewis, 1978; Waliczek et al., 2005). In a study of female inmates, Migura et al. (1997) found that substance abusers who participated in a gardening program reported higher global life satisfaction when compared to their reports prior to this program. Furthermore, research by Robinson and Zajicek (2005) reported that children who scored significantly lower on a Life Skills Inventory were able to score similarly to children who did not initially score lower after a 1 year school gardening program, indicating that these children improved teamwork skills and self-understanding as a part of their school gardening program.

Aguilar et al. (2008) reported that children with previous gardening experience scored statically significantly higher on measures of environmental attitudes when compared to children without previous gardening experiences, indicating that one benefit of gardening was improving environmental attitudes. Furthermore, Koch et al. (2006) reported that 2nd through 5th graders who participated in a "Health and Nutrition from the Garden" program had higher scores on a nutritional knowledge inventory and better snack choices after participating in the program when compared to their scores and choices before participating in the program. These studies indicated a widespread impact from active participation in nature and gardening for both adults and children.

Alternatively, passive interactions include those that are visual and more observational in character. MacKay (1990) described passive interactions as when the "user interacts subconsciously with the landscape when using or moving within its masses and spaces" (p. 113). The mere presence of plants "improves the quality of our lives in many ways: environmentally, economically, socially, culturally and physically through our health and well-being" (Zampini, 1994, p. 185). For example, undergraduate students reported more positive feelings about their overall well-being and about their experiences within the university setting when they spent more time interacting in university green spaces (McFarland et al., 2008).

Research produced studies that investigated the effects of passive interactions with nature. Kaplan and Kaplan (1989) reported, "People with access to nearby natural settings have been found to be healthier overall than other individuals. The longer-term, indirect impacts (of 'nearby nature') also included increased levels of satisfaction with

one's home, one's job and with life in general" (p. 173). With findings that indicated a relationship between the physical environment and health, researchers concluded, "These studies demonstrate that human responses to vegetation are not merely aesthetic; they are affective and cognitive as well. Vegetation can make people feel better" (Sheets and Manzer, 1991, p. 302).

Studies in the field of people/plant interactions have also focused on the impacts nature interactions can have on children (Davies and Cohen, 1995; Dresner and Gill, 1994; Heerwagen, 1990; Moritari, 2000; Taylor et al., 2002; Ulrich, 1984; White and Heerwagen, 1998). Dresner and Gill (1994) investigated the effects of an environmental education program at a summer nature camp. At this camp, children spent time hiking, observing wildlife including elks, birds, otters, and other animals, and backpacking. Through this camp, the researchers found not only an increase in environmental awareness and concern, but also an increase in curiosity and eagerness, a decreased interest in television, and an improvement in self-esteem (Dresner and Gill, 1994).

Another study investigated the effects of a similar camp on teenagers at risk for drug abuse (Davies and Cohen, 1995). As a part of this camp, students were required to participate in various activities outdoors in a natural environment. The researchers found decreased scores on a depression inventory, decreased drug use, and an improvement in self-esteem after participation in this camp (Davies and Cohen, 1995).

Multiple benefits have been found for children who spend time in or near green areas (Moritari, 2000; Taylor et al., 2002; Wells, 2000; Wells and Evans, 2003). For example, Taylor et al. (2002) reported that having green space immediately outside the

home related to female inner-city children scoring more positively on measures of concentration, inhibition of impulses, and delay of gratification. However, these findings did not apply to male children in the study. Furthermore, Moritari (2000) found that when young urban children were repeatedly exposed to natural spaces, they learned to appreciate quiet time and self-reflection, and that their world view of what constituted a good quality of life changed to be less focused on material objects (Moritari, 2000). Additionally, Wells and Evans (2003) found that children with more nearby nature felt less of an impact from life stress than children with less nearby nature. Finally, Wells (2000) found that children who moved from homes with few natural elements to homes with more natural elements experienced an increase in the ability to direct their attention, and that those children who experienced the greatest change in nearby natural elements experienced the greatest increase in the ability to concentrate.

Horticultural Therapy

Horticultural therapists have long recognized the benefits of activities such as sorting seeds, sowing seeds, sifting, filling containers, and watering plants to the improvement or development of fine and gross motor skills (Gigliotti et al., 2002). In fact, one of the many goals of horticultural therapy programs is to "assist patients in enhancing body awareness and effectiveness by helping patients develop physically through the enhancement of strength, mobility, endurance, coordination, and fine motor skills" (Wedel and Murrey, 2006, p. 13).

In a limited sample, a Japanese study found that patients with paralysis following a stroke were able to make progress using their hands by using scissors or pruning

through a horticultural therapy program (Zushi, 2004). Furthermore, the same study reported 2 cases of Alzheimer's patients who experienced improvement in fine motor skills through the course of the same 2 month program. The researchers noted, however, that the program was too short to make definitive evaluations about the improvement of these patients (Zushi, 2004).

Children and Gardening

School gardening has been a popular area of research in the fields of horticulture and education in recent years (Klemmer et al., 2005; Pigg et al., 2006; Robinson and Zajicek, 2005; Skelly and Bradley, 2000) to investigate childrens' active interactions with plants and nature. Skelly and Bradley (2000) found that gardening was used as an instructional tool less than 10% of the time, but that teachers reported that activities enhanced student learning. They further reported that school gardens were most often used to teach science and environmental education (Skelly and Bradley, 2000). Other studies have looked more specifically at the benefits children gained from utilizing school gardens (Klemmer et al., 2005; Pigg et al., 2006; Robinson and Zajicek, 2005). Robinson and Zajicek (2005), for example, looked at the effects of participating in a school gardening program on life skills of elementary children. They noted other research studies showing that gardens had the opportunity to teach such skills as delayed gratification (Alexander et al., 1995). Their research found benefits to children participating in school gardening in the areas of improved teamwork and improved self-understanding which are valuable skills to succeed in other areas of life (Robinson and Zajicek, 2005). Adults also reported noticing an improvement in the academics, self-

esteem, and stress reduction in children as a result of participating in gardening activities (Waliczek et al., 2000).

The specific academic benefits students may gain from participating in school gardening is also important in this area of research (Klemmer et al., 2005; Pigg et al., 2006). Klemmer et al. (2005) found that the science achievement of students who participated in a hands-on gardening program as a part of their science curriculum was higher when compared to students who only participated in traditional science curriculum. Alternatively, Pigg et al. (2006) found no statistically significant difference in science scores for students who participated in a hands-on gardening program, and actually found an inverse effect on math scores indicating traditional math lessons were more effective at teaching math concepts. Since their findings were different from other research, they discussed a need for more studies and curriculum development specifically in regards to mathematics (Pigg et al., 2006).

Research has also looked at the effects of participating in outdoor science activities on children. These programs often design active hands-on outdoor activities and exercises to teach science-related topics (Waliczek et al., 2003) and provide a fun environment for children to learn and apply these concepts to real settings (Alexander et al., 1995). Waliczek, et al. (2003) found that students who were in these programs engaged in application and synthesis skills as a part of the program. This finding supported past research that showed that school gardening programs provided children with the opportunity to apply school lessons (Braun, 1989).

Today's Children

Regardless of the research suggesting outdoor time is necessary for providing challenges to youth (Caldwell, 2005), many studies focused on how children spend their time (Hofferth and Sandberg, 2001) concluded that many American children were spending significant amounts of time in sedentary activity (Pellegrini and Smith, 1998). Along with this increase in sedentary lifestyles, it has been reported that health issues such as obesity (Troiano et al., 1995) and Type II diabetes (Fagot-Champagna et al., 2000) were on the rise among young children (Burdette et al., 2004). In fact, children as young as 2 years old were found to be increasing in weight to height ratio (Ogden et al., 1997). This weight increase has been attributed to decreased physical activity and to increased food intake of today's children (Andersen, et al., 1998; Ebbeling et al., 2002; Epstein et al., 2002; Ness et al., 2007; Schlicker et al., 1994; Trost et al., 2001). Ebbeling et al. (2002) stated, "Prevention and treatment of obesity ultimately involves eating less and being more active" (p. 476). However, they noted that this may be difficult in children due to their immaturity and their susceptibility to peer influences (Ebbeling et al., 2002).

New recommendations from the American Heart Association stated children needed up to 60 minutes of vigorous activity per day (Kavey et al., 2003). A study of 5500 children, both boys and girls who were approximately 12 years old, recorded an average of only 19.7 minutes per day (25.4 minutes per day for boys and 15.8 minutes per day for girls) of moderate to vigorous physical activity for 7 days using an accelerometer (an electronic motion sensor worn either around the wrist or near the hip)

(Ness et al., 2007). Additional research using an accelerometer on 467 children ages 4 to 6 in Iowa reported that boys participated in an average of 31.8 minutes per day of vigorous activity and girls 24.6 minutes per day (Janz et al., 2002). Another study using an accelerometer in Massachusetts found that children in grades 1 through 3 consistently met the 60 minutes of vigorous activity per day guideline during the school week, but for students in grades 10 through 12, only one-third of males and one-fourth of females took part in vigorous physical activity 60 minutes or more per day (Pate et al., 2002). These studies all indicated that children were not developing habits to consistently achieve the vigorous activity recommendations throughout their lives, and that children tended to only achieve the goal of 60 minutes of vigorous activity when they were required to take Physical Education classes in school (approximately grades 1 through 10) or when they had recess periods (approximately grades Pre-K through 5). Sallis et al. (2000) reported that time spent outdoors is consistently a predictor of children's physical activity level.

Research indicated that many adults associated their childhood with playing outdoors, most often in natural settings (which are harder to find in urbanized areas), including playgrounds, gardens, and parks (Francis, 1995). Research has also revealed that, other than at home, natural areas or parks were the most likely settings for play for after-school activities (Cunningham et al., 1996). In contrast, children today are spending an increasing amount of time indoors compared to outdoors (Karsten, 2005; Tranter and Doyle, 1996). The American Heart Association stated that children needed up to 60 minutes of vigorous activity per day (Kavey et al., 2003). However, a study conducted at the University of Michigan utilizing time diaries of 2380 households with

children across the United States, reported that only 18% of children under the age of 13 years old spent approximately 30 minutes a week in outdoor activities. Alternatively, 97% of children spent time watching television indoors, with an average of 12 hours spent per week on this indoor activity (Hofferth and Sandberg, 2001). Television viewing has been linked to obesity in children because it both supplants physical activity and leads to increased food intake (Ebbeling et al., 2002). Ebbeling et al. (2002) stated, "Children seem to passively consume excessive amounts of energy dense foods while watching television" (p. 475). They also noted that television advertising for non-healthy foods influenced children's food choices (Ebbeling et al., 2002). Furthermore, fewer hours of television viewing has been found to be correlated with better gross motor development in young children (Graf et al., 2004).

In a study of 830 mothers in cities, suburbs, small towns, and rural areas across the U.S., asking the mothers to recall their childhood and to compare that to their children, 70% of the respondents reported playing outside on a daily basis, but only 31% of their children did so (Clements, 2004). Furthermore, 56% of mothers spent more than 3 hours outdoors at a time during their childhood, but only 22% of their children spent more than 3 hours outdoors at a time. Finally, 85% of the respondents to this study agreed their children spent less time outdoors than they did as a child (Clements, 2004).

Time spent in outdoor activities versus indoor activities has been shown to positively affect dietary habits, calorie intake (Blass et al., 2006; Coon et al., 2001; Lautenschlager and Smith, 2007), obesity and body mass index in children (Ludvigsson et al., 2007; Proctor et al., 2003). Additionally, among preschool aged children, most

physical activity has been reported to occur in the form of free play (Burdette et al., 2004). Free play is informal, unstructured, typically outdoor child-driven activities (Burdette and Whitaker, 2005; Burke, 2005), frequently characterized by "short intermittent bouts of activity with frequent rest periods" (Burdette et al., 2004, p. 353). In fact, free outdoor play is children's preferred form of physical activity when compared to sports or exercise (Graf et al., 2004; Burdette and Whitaker, 2005; Burke, 2005). Not only is free play the preferred form of physical activity, Bailey et al. (1994) reported that more physical activity occurred when American children were given the opportunity to free play when compared to when they were given structured activities. Furthermore, when children play in natural areas, their motor fitness, balance, and coordination are better when compared to children who play in a traditional playground (Fjortoft, 2004).

Research supporting the importance of outdoor activity (Klesges et al., 1984; Burdette et al., 2004) reported a positive correlation between parental reports of time spent outdoors in preschool children and physical activity in these children, as well as an inverse relationship between time spent outdoors and sedentary activities such as television viewing. In addition, in a study of 250 Cincinnati area children ages 29-52 months old (mean age 44 months), Burdette et al. (2004) reported that these children spent a mean of 146 minutes playing outdoors per day with statistically significantly more time spent outdoors during summer months when compared to any other season (243 minutes per day during the summer, 167 minutes per day in the autumn, 88 minutes per day in spring, and 79 minutes per day in the winter) (Burdette et al., 2004). Although

Burdette et al. (2004) reported very large means for time spent outdoors, this study is a recall self-report study and reported very large ranges (±145 minutes per day in the summer).

In addition, illnesses such as asthma and allergies (Dimich-Ward et al., 2006; Ring et al., 2001) have increased due to a lack of exposure to and immunity to allergens. For example, Kramer et al. (1998) reported that in a study of 2471 German children, those who attended daycare at a young age had a lower instance of testing positive for allergens when compared to children who started daycare attendance at a later age. They suggested that this result may be due to increased exposure to allergens at an early age (Kramer et al., 1998). These conclusions may be extended to outdoor allergens as well. For example, Riedler et al. (2000) reported that children in Austria who lived on farms with access to animals had lower rates of asthma and local allergen sensitivity (determined by a skin test) when compared to children raised in a non-farming environment. A Swiss study reported similar findings (Braun-Fahrlander et al., 1999).

Squillace et al. (1997) reported a study of indoor allergens noting that increased time spent in environments where dust mites were present was a leading risk factor for asthma, and noted that, "The changes that should be considered include… the complex changes associated with progressive increase in indoor entertainment, and the simple effects of spending more time indoors" (p. 1763). The reports of the above studies would suggest that spending more time in outdoor environment would further improve health, not only by improving physical activity and diet, but also by helping to prevent and alleviate asthma and allergies.

Parental Attitudes

Psychology's social learning theory (Bandura, 1973; Bandura, 1974) posits that children learn how to act and behave by modeling the behaviors they observe. In Bandura's et al. (1961, 1963) and Bandura's (1965) series of hallmark "Bobo doll" (a plastic doll that uprights itself after being knocked over) studies, researchers reported that children, especially boys, are more likely to display aggressive behaviors when they first watch an adult model those behaviors and secondly, watch the adult be rewarded for those behaviors.

Furthermore, sociology's "Primary Socialization Theory" (Oetting and Donnermeyer, 1998) adds by suggesting that, "In Western society the primary socialization sources through the critical adolescent period are usually the family, the school, and peer clusters." (p. 998.) Research has found that parental attitudes had a strong influence on children, and parents may even be the most important influence on children's attitude development (Brown, 1990; Collins et al., 2000; Hutchinson and Baldwin, 2005). For example, children's attitudes about exercise and physical activity have been found to be similar to their parents' attitudes about exercise (Dowell, 1973; Godin and Shepard, 1984; Trost et al., 2003). Researchers believe that positively changing parents' knowledge, attitudes, and beliefs regarding physical activity and eating would be a significant factor in preventing childhood obesity (Dietz and Gortmaker, 2001).

Mothers were reported to recognize the value of outdoor play for their child's motor skill development (Clements, 2004). Clements (2004) found that 93% of mothers

agreed that outdoor play helps their children develop motor skills. Furthermore, parents have strong influences on their children's physical activity levels, as research has found activity levels in children to increase at the parents' encouragement (Klesges et al., 1984; Klesges et al., 1986; McKenzie et al., 1991).

So much attention recently has been focused on the fact that children are spending so little time outdoors that it has been termed "Nature-deficit disorder" (Louv, 2008). According to Louv, this term "describes the human costs of alienation from nature, among them: diminished use of the sense, attention difficulties, and higher rates of physical and emotional illnesses" (p. 36) and can be detected at multiple levels of society including the individual and community.

Although parents were aware of the multitude of benefits derived from outdoor play, research reported the amount of time children spent in outdoor play was directly related to concerns of their children being exposed to traffic, strangers, injuries, and other outdoor hazards (Cahill, 1990; Carver, et al., 2008; Louv, 2008; McNeish and Roberts, 1995; Rivkin, 2000; Valentine and McKendrick, 1997). Louv (2008) also extensively documented legal concerns regarding liability for injuries that may occur during outdoor play. Valentine and McKendrick (1997) reported that in a study on the opinions of parents with children age 8 to 11 years old, parental concerns about the safety of their children were the most important indicator of children's access to independent outdoor play, and that parents were equally concerned about the risks for both girls and boys. Reports from a qualitative study of 78 mothers supported Valentine and McKendrick's (1997) findings stating that 94% of parents were concerned about

safety and reported that this was a major influence on where they allowed their children to play (Veitch et al., 2005). The most notable safety concerns mentioned were stranger dangers, teenagers and gangs, and road traffic (Veitch et al., 2005). Sallis et al. (1997) investigated the factors parents consider when looking for a play area for their children. Two of the more important factors found were safety and lighting of the area (Sallis et al., 1997). Furthermore, McNeish and Roberts (1995) reported that 60% of parents were very worried about their children when they played outdoors, and that 85% felt that the safety of children when playing outdoors had declined since the parents were children. Parental concerns about violence and traffic conditions were additional reasons for restricting their children's outdoor time (Gielen et al., 2004). Safety concerns severely limit children's opportunities for outdoor, physical play (Veitch et al., 2005).

Summary

Early developmental theorists emphasized that motor development was essential to other areas of childhood development. Through different researchers, current theory recognizes that motor development does not occur independent of experience, but that experience plays a significant role in development. Current research further recognizes the importance of these experiences taking place at an early age to have the greatest impact on their physical growth and overall development. Failing to develop adequate motor and coordination skills can have an array of effects on children including increased incidence of attention disorders, problems with self-esteem, lower educational achievements, and social problems.

Play, particularly outdoor play, has been shown to be an important way to expedite the development of motor skills since it is through play that children have the opportunity to explore their motor functioning by utilizing their senses and muscles. Researchers and parents alike recognize the importance of outdoor play. Unfortunately, regardless of this recognition, children today are spending increasing quantities of time indoors, which is having greater effects on children than just their motor development. Spending more time indoors is also negatively affecting children by increasing the rates of childhood obesity, Type II diabetes, asthma, and allergies. Researchers in horticulture and other areas have reported that increasing time spent outdoors in nature in both passive ways (such as just walking outdoors) and active ways (such as gardening) can have significant benefits to both children and adults.

The purpose of this research project was to investigate the relationship between parental attitude toward nature and the development of fine and gross motor skills in young children.

CHAPTER III

METHODOLOGY

Statement of Purpose and Objectives

The purpose of this research project was to investigate the relationship between parental attitude toward nature and the development of fine and gross motor skills in young children.

Objectives

The specific objectives of this study were:

1. To investigate parental attitude toward nature.
2. To investigate parental attitude toward their child's outdoor recreation.
3. To investigate the relationship between parental attitude toward nature and parental attitude toward their child's outdoor recreation.
4. To investigate the relationship between the amounts of time spent in outdoor activities and the development of fine and gross motor skills in young children.
5. To investigate the relationship between time spent in various activities with parental attitudes toward nature and attitude toward their child's outdoor recreation.
6. To investigate the relationship between parental attitude toward their child's outdoor recreation and the development of fine and gross motor skills in their children.

7. To compare parental preferences for play areas based on the natural and artificial elements of the setting.

The following hypotheses were tested:

H1: Parents who have positive attitudes toward nature will have more positive attitudes toward their child's outdoor recreation.

H2: Children whose parents have more positive attitudes toward their outdoor recreation will have better scores on motor development tests.

Sample

The sample for this study was a convenience sample drawn from Texas A&M University Becky Gates Children's Center and the Texas State University Child Development Center. Both centers serve faculty, staff, and students of their respective universities. The Texas A&M University Becky Gates Children's Center serves 152 children from age 8 weeks to 5 years old (Becky Gates Children's Center, n.d.). Of those 152, approximately 100 children are served each year between the ages of 3 and 5 years old. At the Texas State University Child Development Center, approximately 50 children each year are served between the ages of 3 and 5 years old.

All families with children between the ages of 3 and 5 years old were requested to participate and given the questionnaire packet. A total of 145 packets were distributed to families between the two sites with 92 to parents at the Texas A&M University Becky Gates Children's Center and 53 to parents at the Texas State University Child Development Center.

Instrumentation

The assessment tool used in this study was composed of several sections that asked parents about their attitudes toward nature and outdoor settings, their attitudes about their young children spending time outdoors, how much time their children actually spent in outdoor activities, and standard demographic questions. The instrumentation was developed using Dillman's (2007) tailored design method which is "a set of procedures for conducting successful self-administered surveys that produce both high quality information and high response rates" (p. 29). The instrument was reviewed by other researchers and experts of horticultural sciences for content and face validity.

Parental Attitude toward Nature Instrumentation

Questions asking parents to rate various statements relating to their attitude toward nature and outdoor settings were drawn and adapted from other studies about attitudes toward nature and recreation (Ennis, 2003; Murphy, 1984; Piotrowski, 2007; Skelly, 1997). These questions ask parents to rate various statements on a 6-point Likert-type (Likert, 1967) scale with responses ranging from "strongly agree" to "strongly disagree."

Parental Attitudes toward Their Child's Outdoor Recreation Instrumentation

Research suggested that parental concerns about "traffic, firearms, kidnapping, injury, ultraviolet rays… and pollution of various sorts lead them to keep children indoors" (Rivkin, 2000, p. 1). In this section, parents responded to statements about their concern for their children spending time outdoors due to these factors using a 6-

point Likert-type (Likert, 1967) scale with responses ranging from "strongly agree" to "strongly disagree." These statements were drawn from similar studies investigating these concerns (Ennis, 2003; McMillan, 2003; Murphy, 1984; Piotrowski, 2007; Timperio et al., 2004; Weir et al., 2006).

Picture Section

This section of the instrument included pictorial representations of various play environments and asked parents to rate their comfort level with allowing their child to play in the environment (McCans, 2004). Six different pictures were included with play areas ranging from completely wild with no man-made elements visible to indoor and completely artificial environments. Parents were asked to evaluate each of the pictures shown in regard to the statement "I feel completely comfortable allowing my child to play in an area like this with appropriate supervision." The possible responses were on a 6 point Likert-type scale with responses ranging from "strongly agree" to "strongly disagree"

Demographics

Finally, standard demographic questions were asked including parent and child gender, child's age, ethnicity, and parent marital status. This section also asked parents to describe the area they live as rural, suburban, urban, or inner city, as well as to quantify the amount of time their children spend in outdoor and indoor activities. The demographic section of the instrument was modeled after similar instruments (Dravigne, 2006; Waliczek et al., 1996), and reviewed by researchers in the social and horticultural sciences for face and content validity.

Scoring

Responses to the "Parental Attitude toward Nature" and "Parental Attitude toward Their Child's Outdoor Recreation" sections of the questionnaire were scored based on the responses given. For positively stated questions such as, "I enjoy pictures of birds and animals" responses of a 1 were given 1 point, responses of 2 were given 2 points, 3 were given 3 points, 4 were given 4 points, 5 were given 5 points, and 6 were given 6 points. Negatively stated questions such as, "Walking in the woods is a waste of time" were reverse coded such that responses of 1 were given 6 points, 2 were given 5 points, 3 were given 5 points, 4 were given 3 points, 5 were given 2 points, and 6 were given 1 point. The score was derived for each section by taking the cumulative sum of the responses for each section.

Pilot Test and Scale Reliability

The instrumentation was pilot tested with parents who responded to the questionnaire using an on-line survey. A link to the pilot test was posted on the Aggie Horticulture home web page between March and August 2009. The self-selected parents completed the survey with the compensation of a wildflower seed packet for assisting in pilot testing. Pilot test participants accessed the survey from the link on the Aggie Horticulture web page and then agreed to privacy and consent information and acknowledged that he/she understood that participation in the study was voluntary.

This pilot test was used to estimate the reliability of the instrument and adjustments were made based on the data collected from the pilot test. Reliability of a scale is the consistency in measurement when the scale is administered several times to

the same individual (Gay and Airasian, 2003). A more reliable scale has a better chance to obtain the same score from the test if it was re-administered to the same people. A less reliable scale will yield different scores if re-administered to the same people (Gay and Airasian, 2003).

The reliability coefficient is an indication of how much the instrument measures real characteristics instead of transitory ones (Tuckman, 1999). Reliability scores range from 0.0 to 1.0. A reliability score of to 1.0 indicates that no error is present within the instrument. Therefore, the closer a reliability score is to 1.0, the greater the likeliness that the differences measured were actual differences (Gall et al., 2006). To test the reliability of one test taken one time, an internal consistency measure of reliability is used (Gay and Airasian, 2003). To determine how all the items of an instrument relate to each other and to the overall instrument, a Cronbach's alpha is calculated (Gay and Airasian, 2003).

An initial Cronbach's reliability analysis of the Parental Attitude toward Nature scale estimated that the 21 item scale had a high reliability (α=0.87) (Gall et al., 2006). Item analysis indicated that removing six items from this scale would improve the estimated reliability to α=0.88. These items were removed from the final instrument to slightly improve the reliability and to reduce the load on participants. This scale on the final instrument had 15 items. A Cronbach's reliability analysis of the final instrument after data collection showed this section of the instrument had a high reliability of α=0.85.

A Cronbach's reliability analysis of the 29 item Parental Attitude toward Their Child's Outdoor Recreation also estimated a high reliability of α=0.87 (Gall et al., 2006). Item analysis on this scale indicated that removing one item would improve the reliability to α=0.90. This scale on the final instrument contained 28 items. A Cronbach's reliability analysis of the final instrument after data collection showed this section of the instrument had a high reliability of α=0.89.

Motor Skill Observations

The university children's centers provide regular observations of the development of fine and gross motor skills in children as a part of the program. These records were obtained from the program with consent from parents who completed the attitudinal section of the questionnaire. Only the most recent evaluation was used for this study.

The childcare centers both assess children's overall development skills; although, each center uses a different method. The Texas A&M Becky Gates Children's Center uses the developmental milestones chart illustrated in "Kidex for Threes" (Boyd, 2006a) and "Kidex for Fours" (Boyd, 2006b) and makes evaluations twice a year. The Texas State University Child Development Center uses the "Ages and Stages" method (Bricker and Squires, 1999).

Both methods are checklist type formats. The Kidex (Boyd, 2006a, 2006b) method evaluates every half year of the child's age (3 to 3.5 years old, 3.5 to 4 years old, 4 to 4.5 years old, and 4.5 to 5 years old) and the Ages and Stages method (Bricker and Squires, 1999) evaluates every three months. In both methods caregivers evaluate the

child's performance on a variety of "developmental milestones." The teachers rate the child as either "Yes" the child does perform the milestone, "Sometimes" the child can perform the milestone, or "Not yet" if the child does not yet perform the milestone. The Ages and Stages method specifies categories of questions for both fine and gross motor skills among other categories. The Kidex method does not specify categories, but some of the milestones are related to the development of fine and gross motor skills such as "Cut on a straight line" or "Stack 10 or more blocks", while others related to more cognitive based abilities such as "Understand and obey simple rules" and "Share and take turns most of the time." The Ages and Stages method asks the same questions regardless of age, but sets the cut-off point for identifying under-developing children differently depending on age.

For the Ages and Stages method, only the questions categorized as fine and gross motor skills were used and each of the two categories contained 6 questions for a total of 12 statements of use to this study. Prior to the study, the milestones in the Kidex method that related to the development of fine and gross motor skills specifically were identified, and only those were used in the scoring. The Kidex method has different numbers of related questions for each age-group evaluation. Both methods use similar evaluative statements where for each milestone the child is rated as either "Not yet," "Sometimes," or "Yes." Only the Ages and Stages method converts these ratings numeric scores: "Not yet" scores zero points, "Sometimes" scores 5 points, and "Yes" scores 10 points. The Kidex method does not specify points assigned to each evaluative

statement; however, for consistency, the same points were assigned prior to data analysis.

Since each age-group scale in the Kidex method had a different number of fine and gross motor skill milestones, the raw scores for both methods were statistically normalized by converting the raw research scores into Z-scores before comparison. This allowed for comparison between the "Kidex" method and the "Ages and Stages" method.

Data Collection and Analysis

Information about the study was handed out to families who have children enrolled in either center between the ages of three and five. Sending a small incentive with the request to complete a questionnaire improves response rate, while promising an incentive for completing it does not (Dillman, 2007). The actual questionnaire, a consent form, a wildflower seed packet offered as incentive, and instructions were distributed to the families at the centers. Participants agreed to privacy and consent information and acknowledged that participation in the study was voluntary. Respondents were asked to complete the questionnaire which took approximately 30 minutes.

A second contact, a postcard thank you/reminder, was distributed by the centers one week after receipt of the questionnaire. Research has found that a postcard follow-up with this timing can increase response rate by eight percent (Dillman et al., 1995). The third and final contact included a replacement questionnaire and was made approximately three weeks after the first questionnaire was given to families at the

center. Each of these contacts has been shown to be necessary by Dillman (2007) to increase response rate. Non-response was controlled for by separating early- and late-responders and conducting statistical analysis to identify any differences between the two groups on either attitudinal scale, the amount of time their children spent in various activities, or fine and gross motor skill development (Lindner et al., 2001). According to Linder et al. (2001), late-responders are similar to non-responders. Early-responders were identified as those who responded to the first survey packet distributed and late-responders were identified as those who responded to the second survey pack distributed.

The data were analyzed using the SPSS® for Windows Release 17.0. Descriptive statistics and frequencies were conducted to describe the sample. Although not a part of the objectives of this research, analysis of variance (ANOVA) were conducted utilizing the demographic responses to assess whether any demographic group of parents appear to have more or less positive attitudes toward nature and allowing their children to spend time outdoors. Additionally, ANOVAs were conducted to determine any differences between motor skill development scores between children whose parents had more positive attitudes toward nature when compared to children whose parents had less positive attitudes toward nature. Finally, Pearson's product-moment correlations were used to determine the strength of the relationship between the amounts of time spent in various activities and the motor development of children.

CHAPTER IV

RESULTS AND DISCUSSION

This chapter will present, analyze and interpret the data collected in order to fulfill this study's purpose to investigate the relationship between parental attitude toward nature and the development of fine and gross motor skills in young children.

Objectives

The specific objectives of this study were:

1. To investigate parental attitude toward nature.
2. To investigate parental attitude toward their child's outdoor recreation.
3. To investigate the relationship between parental attitude toward nature and parental attitude toward their child's outdoor recreation.
4. To investigate the relationship between the amounts of time spent in outdoor activities and the development of fine and gross motor skills in young children.
5. To investigate the relationship between time spent in various activities with parental attitudes toward nature and attitude toward their child's outdoor recreation.
6. To investigate the relationship between parental attitude toward their child's outdoor recreation and the development of fine and gross motor skills in their children.
7. To compare parental preferences for play areas based on the natural and artificial elements of the setting.

The following hypotheses were tested:

H1: Parents who have positive attitudes toward nature will have more positive attitudes toward their child's outdoor recreation.

H2: Children whose parents have more positive attitudes toward their outdoor recreation will have better scores on motor development tests.

Demographics

The target population for this study was adults with children aged three to five. This age group was selected because it represented children at an age where their motor skills are particularly vulnerable to their environment (Chugani, 1998). Responses were gathered from a total of 73 people from the 145 distributed, for a response rate of 49.7%. Of the 73 questionnaires returned, only 69 had the results from the corresponding motor skills inventory and could be used in the final data analysis. Of the 69 usable questionnaires returned, 50 were from parents of children enrolled at the Texas A&M University Becky Gates Children's Center and 19 were from parents of children enrolled at the Texas State University Child Development Center.

Of those parents who responded, 13(18.8%) were male and 56 (81.2%) were female. The children included in the study consisted of 41 male children (59.4%) and 28 female children (40.6%). Children were ages 3 to 5, with a mean age of 3.78 years old. With regards to ethnicity, 43 (62.3%) respondents indicated that they were "White," 2 (2.9%) were "African American," 8 (11.6%) indicated "Hispanic," 13 (18.8%) indicated "Asian or Pacific Islander," and 3 (4.3%) indicated "None of the above." The vast majority of respondents were "Married/Partnered" with 66 (95.7%) respondents

selecting this category for marital status. Other responses to this question indicated that 1 (1.4%) participant selected each of the following categories: “Single, never married,” “Divorced,” and “Widowed.”

Respondents were also asked to indicate the area in which they live. In response, 9 (13.0%) participants indicated a “Rural” environment, 38 (55.1%) indicated a “Suburban” area, 18 (26.1%) indicated “Urban,” and 4 (5.8%) indicated that they considered the area they lived in to be “Inner City.”

Respondents indicated their education level. “Some college” was selected by 6 (8.7%) participants, “4 year college degree” was selected by 9 (13.0%) participants, “Graduate school” was selected by 53 (76.8%) participants, and “Other” was selected by 1 (1.4%) participant.

A section of the demographics also requested information regarding the yearly household income of the families in the study. Responses indicated that 1 (1.4%) participant indicated “Less than $14,999,” 7 (10.1%) indicated “$15,000-$29.999,” 4 (5.8%) indicated “$30,000-$49,000,” 14 (20.3%) indicated “$50,000-$74,999” 9 (13.0%) indicated “$75,000-$99,999” and 33 (47.8%) indicated “$100,000 and above.” One (1.4%) respondent declined to respond to this question (Table 1).

Table 1. Demographic analysis of the overall sample by gender of parent, gender of child, ethnicity, marital status, residential area, education level and income level in the study of the relationship between parental attitude toward nature and the development of fine and gross motor skills in children.

Demographic variable	n	Parental Attitude toward Nature Mean score[z]	Parental Attitude toward Their Child's Outdoor Recreation Mean score[y]	Mean Overall Motor Skills Z-score[x]	Mean Fine Motor Skills Z-score[w]	Mean Gross Motor Skills Z -score[v]
Gender of Parent						
Male	13	80.00	141.16	-0.15	-0.23	0.22
Female	56	80.38	143.77	0.03	0.05	-0.05
Gender of Child						
Male	41	79.29	144.02	-0.13	-0.08	-0.04
Female	28	81.79	142.18	0.19	0.12	0.07
Age of Child						
3	33	80.21	143.76	-0.06	-0.02	-0.08
4	29	79.52	142.28	0.07	0.08	-0.04
5	7	84.00	145.14	-0.01	-0.23	0.57
Ethnicity						
White	43	80.42	145.07	0.01	-0.05	0.12
Asian/Pacific Islander	13	79.38	135.77	-0.18	0.03	-0.50
Hispanic	8	79.00	140.75	-0.15	-0.18	0.11
African American	2	86.50	162.00	0.71	0.41	0.19
None of the Above	3	82.00	144.33	0.58	0.72	0.01
Marital Status						
Single, never married	1	68.00	126.00	-0.71	-0.71	-0.71
Married/Partnered	66	80.76	144.97	0.02	0.01	0.02
Divorced	1	77.00	106.00	-0.83	-0.50	-0.33
Widowed	1	66.00	86.00	0.34	0.48	-0.38
Residential Area						
Rural	9	78.67	150.78	0.38	0.28	0.23
Suburban	38	81.05	144.03	0.02	0.03	-0.04
Urban	18	78.78	138.44	-0.32	-0.36	0.05
Inner City	4	83.75	141.00	0.40	0.70	-0.38

Table 1 Continued

Demographic Variable	n	Parental Attitude toward Nature Mean Score[z]	Parental Attitude toward Their Child's Outdoor Recreation Mean Score[y]	Mean Overall Motor Skills Z-Score[x]	Mean Fine Motor Skills Z-Score[w]	Mean Gross Motor Skills Z-Score[v]
Education Level						
Some college	6	79.00	148.83	0.22	0.12	0.26
4 year college degree	9	84.11	149.11	0.02	-0.05	0.15
Graduate School	53	80.21	142.75	-0.03	-0.01	-0.06
Other	1	59.00	85.00	-0.13	-0.19	-0.09
Yearly Household Income						
Less than $14,999	1	68.00	126.00	-0.71	-0.71	-0.71
$15,000-$29,000	7	80.00	132.00	-0.21	0.26	-0.96
$30,000-$49,000	4	84.50	152.50	0.44	0.25	-0.16
$50,000-$74,999	14	81.50	143.07	0.05	0.03	0.12
$75,000-$99,000	9	78.44	136.78	0.44	0.59	-0.30
$100,000 and above	33	80.88	148.70	-0.08	-0.23	0.27

[z]Possible scores ranged from 15 to 90. Actual scores ranged from 59 to90.
[y]Possible scores ranged from 28 to 168. Actual scores ranged from 86 to166.
[x]Scores ranged from -3.29 to +1.28.
[w]Scores ranged from -3.57 to +1.56.
[v]Scores ranged from -2.72 to +2.67.

Three regression analyses were completed to control for the influence of demographic variables and to ensure homogenous responses to the dependent variables on the variables of interests. All demographic variables (parent gender, child gender, child's age, ethnicity, marital status, residential area, education level, and yearly

household income) were included in the regression equation. Early or late responder categories were also included to control for non-response. Finally, a variable was coded to indicate which of the two test sites the child attended to investigate any influence from the site attended. The regression analyses used the Parental Attitude toward Nature scale mean scores, the Parental Attitude toward Their Child's Outdoor Recreation scale mean score, and overall motor skill Z-score as dependent variables.

The first regression equation attempted to predict the value of the Parental Attitude toward Nature scale using parent's gender, child's gender, child's age, ethnicity, marital status, residential area, education level, yearly household income, responder type, and site attended. The regression equation was not statistically significant (P = 0.85). In addition, no individual independent variable was statistically significant (all P's > 0.05) (Table 2). This indicated that no independent variable had any relationship with the dependent variable of Parental Attitude toward Nature.

Table 2. Regression analysis investigating the effects of gender of parent, gender of child, child's age, ethnicity, marital status, residential area, education level, income level, responder type[z], and site attended on the Parental Attitude toward Nature scale in the study of the relationship between parental attitude toward nature and the development of fine and gross motor skills in children.

	Unstandardized Coefficients		Standardized Coefficient		
Independent Variable	**B**	**Std. Error**	**β**	**T**	***P***
Model					0.85
Constant	76.53	12.82		5.97	0.00*
Gender of Parent	1.18	2.47	0.07	0.48	0.64
Gender of Child	1.75	1.88	0.13	0.93	0.35
Child's Age	1.16	1.45	0.11	0.80	0.43
Ethnicity	-0.23	0.56	-0.06	-0.41	0.68
Marital Status	-3.13	2.06	-0.20	-1.52	0.13

Table 2 Continued

	Unstandardized Coefficients		Standardized Coefficient		
	B	**Std. Error**	**β**	**T**	***P***
Residential Area	1.26	1.25	0.14	1.01	0.31
Education Level	-0.23	1.92	-0.02	-0.12	0.90
Yearly Household Income	0.15	0.81	0.03	0.18	0.86
Responder Type[z]	-0.22	2.06	-0.02	-0.11	0.92
Site Attended	-0.05	2.32	-0.01	-0.02	0.98

*****Statistically significant at the 0.05 level.
[z]Categorical variable indicating early responders and late responders to control for non-response.

The second regression equation attempted to predict the value of the Parental Attitude toward Their Child's Outdoor Recreation scale using parent's gender, child's gender, child's age, ethnicity, marital status, residential area, education level, yearly household income, responder type, and site attended. The regression equation was statistically significant ($R^2 = 0.41$, $P = 0.01$). Statistically significant independent variables included marital status ($\beta = -0.45$, $P = 0.01$) and yearly household income ($\beta = 0.28$, $P = 0.05$). All other independent variables were not statistically significant (Table 3). This indicated that marital status and yearly household income were related to the dependent variable of Parental Attitude toward Their Child's Outdoor Recreation. However, the vast majority of the participants in this study were married (95.7%) making any statistical conclusions regarding marital status null due to the sample sizes of the other marital groups being merely one participant. Our finding that parents with a mid-level socio-economic status had the most positive attitude toward their child's outdoor recreation seems to support previous research that found that children of low socio-economic status tend to play outdoors more. However, this play is unstructured

and unsupervised with little parental involvement or control. On the other hand, parents with higher socio-economic status tend to prefer that their children participate in structured activities such as sports (McHale et al., 2001).

Table 3. Regression analysis investigating the effects of gender of parent, gender of child, child's age, ethnicity, marital status, residential area, education level, income level, responder type[z], and site attended on Parental Attitude toward Their Child's Outdoor Recreation in the study of the relationship between parental attitudes toward nature and the development of fine and gross motor skills in children.

	Unstandardized Coefficients		Standardized Coefficient		
Independent Variable	**B**	**Std. Error**	**β**	**t**	***P***
Model					0.01*
Constant	164.85	22.59		7.30	0.01*
Gender of Parent	2.25	4.35	0.06	0.52	0.61
Gender of Child	-3.80	3.31	-0.12	-1.15	0.26
Child's Age	1.25	2.56	0.05	0.49	0.63
Ethnicity	-0.19	0.99	-0.02	-0.19	0.85
Marital Status	-14.94	3.63	-0.45	-4.12	0.01*
Residential Area	-1.67	2.21	-0.08	-0.75	0.45
Education Level	-3.01	3.38	-0.12	-0.89	0.38
Yearly Household Income	2.91	1.42	0.28	2.05	0.05*
Responder Type[z]	3.81	3.63	0.12	1.05	0.30
Site Attended	4.55	4.10	0.14	1.11	0.27

*****Statistically significant at the 0.05 level.
[z]Categorical variable indicating early responders and late responders to control for non-response.

The third regression equation attempted to predict the value of the overall motor skill Z-scores using parent's gender, child's gender, child's age (motor skill scores control for age so there should be no difference between age groups), ethnicity, marital status, residential area, education level, yearly household income, responder type, and site attended. The regression equation was not statistically significant ($P = 0.91$).

Additionally, no individual independent variable was statistically significant (all *P*'s > 0.05) (Table 4). This indicated that no independent variable had any relationship with the dependent variable of overall motor skills Z-score.

Table 4. Regression analysis investigating the effects of gender of parent, gender of child, child's age, ethnicity, marital status, residential area, education level, income level, responder type[z], and site attended on overall motor skills Z-scores in the study of the relationship between parental attitude toward nature and the development of fine and gross motor skills in children.

	Unstandardized Coefficients		Standardized Coefficient		
Independent Variable	**B**	**Std. Error**	**β**	**t**	***P***
Model					0.91
Constant	0.07	1.76		0.04	0.97
Gender of Parent	0.27	0.34	0.11	0.79	0.44
Gender of Child	0.34	0.26	0.18	1.31	0.20
Child's Age	-0.09	0.20	-0.06	-0.44	0.66
Ethnicity	0.02	0.08	0.04	0.29	0.78
Marital Status	-0.04	0.28	-0.02	-0.13	0.90
Residential Area	-0.17	0.17	-0.14	-0.98	0.33
Education Level	-0.08	0.26	-0.05	-0.29	0.77
Yearly Household Income	0.03	0.11	0.05	0.27	0.79
Responder Type[z]	0.06	0.28	0.03	0.21	0.84
Site Attended	-0.13	0.32	-0.06	-0.40	0.69

[z]Categorical variable indicating early responders and late responders to control for non-response.

Findings Related to Objective One

Objective one was to investigate parental attitude toward nature. To investigate this, descriptive statistics were used to tabulate the mean scores on the Parental Attitude toward Nature scale and the mean scores on each individual question within the scale.

Parental Attitude toward Nature Instrument Scoring

Respondents were asked to indicate a response to 15 statements relating to their attitude toward nature on a six-point Likert-type scale (Likert, 1967). Possible responses included "strongly agree," which scored 6 points, "somewhat agree" which scored 5 points, "slightly agree" which scored 4 points, "slightly disagree" which scored 3 points, "somewhat disagree" which scored 2 points, and "strongly disagree" which scored 1 point. Negatively worded statements were reverse coded such that responses disagreeing with the statement scored more points to allow for score accumulation. Non-responses to any question received no points for that question. The cumulative sum of all responses was used as the overall Parental Attitude toward Nature score.

Data Analysis

Parental Attitude toward Nature scale scores ranged from 59 to 90. The full possible range of scores was 15 to 90. The mean score for this scale was 80.30 (SD = 7.37). The mean score divided by the number of questions indicated that the mean per each question was 5.35. This indicated that most parents answered statements as either "somewhat agree" or "strongly agree" suggesting that parents reported an overall positive view of nature (Table 5).

This finding supports current research in other areas. Tourism research has suggested that nature-based tourism is central to the tourism industry in North America with over 2.6 billion visitor days per year in parks and protected areas in the past decade (Eagles et al., 2000; Jones and Scott, 2006). However, other current research suggests that nature-based tourism and recreation is declining (Pergams and Zaradic, 2008).

Regardless of this decline, research in the past decade suggested that adults in the U.S. have expressed concerns about environmental problems and support increased governmental environmental policy regarding a variety of issues (Dunlap, 2002; Guber, 2003; Konisky et al., 2008). Moreover, most people tend to indicate that their favorite place is in a natural setting (Maller et al., 2002).

Table 5. Descriptive statistics indicating frequency of responses to questions on the Parental Attitude toward Nature scale in the study of the relationship between parental attitudes toward nature and the development of fine and gross motor skills in children.

Statement	Min.	Max.	Mean	SD
I really enjoy nature.[z]	4	6	5.61	0.52
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	0	0		
Slightly Disagree	0	0		
Slightly Agree	1	1.45		
Somewhat Agree	25	36.23		
Strongly Agree	43	62.32		
Total	69	100.00		
I enjoy watching the sky on summer nights.[z]	3	6	5.42	0.74
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	0	0		
Slightly Disagree	2	2.90		
Slightly Agree	4	5.80		
Somewhat Agree	26	37.68		
Strongly Agree	37	53.62		
Total	69	100.00		
I enjoy pictures of birds and animals.[z]	3	6	5.30	0.77
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	0	0		
Slightly Disagree	1	1.45		
Slightly Agree	10	14.49		
Somewhat Agree	25	36.23		
Strongly Agree	33	47.83		
Total	69	100.00		

Table 5 Continued

Statement	Min.	Max.	Mean	SD
I like sitting beside a quiet pond.[z]	2	6	5.28	0.86
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	1	1.45		
Slightly Disagree	0	0		
Slightly Agree	12	17.39		
Somewhat Agree	21	30.43		
Strongly Agree	34	49.28		
Total	68	98.55		
Walking in the woods is a waste of time.[y]	2	6	5.74	0.66
	Frequency	Percent		
Strongly Disagree	55	79.71		
Somewhat Disagree	10	14.49		
Slightly Disagree	2	2.90		
Slightly Agree	0	0		
Somewhat Agree	1	1.45		
Strongly Agree	0	0		
Total	68	98.55		
I wish I knew more about nature.[z]	1	6	4.94	1.08
	Frequency	Percent		
Strongly Disagree	1	1.45		
Somewhat Disagree	2	2.90		
Slightly Disagree	33	4.35		
Slightly Agree	11	15.94		
Somewhat Agree	29	42.03		
Strongly Agree	23	33.33		
Total	69	100.00		
People should spend more time outside.[z]	4	6	5.59	0.65
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	0	0		
Slightly Disagree	0	0		
Slightly Agree	6	8.70		
Somewhat Agree	29	42.03		
Strongly Agree	23	33.33		
Total	68	98.55		

Table 5 Continued

Statement	Min.	Max.	Mean	SD
I like TV programs about nature.[z]	2	6	4.99	1.01
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	1	1.45		
Slightly Disagree	6	8.70		
Slightly Agree	11	15.94		
Somewhat Agree	26	37.68		
Strongly Agree	25	36.23		
Total	69	100.00		
I would like to vacation in a cabin in the woods.[z]	2	6	4.90	1.18
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	3	4.35		
Slightly Disagree	5	7.25		
Slightly Agree	18	26.09		
Somewhat Agree	13	18.84		
Strongly Agree	30	43.48		
Total	69	100.00		
I feel good when I am close to nature.[z]	3	6	5.37	0.75
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	0	0		
Slightly Disagree	1	1.45		
Slightly Agree	3	4.35		
Somewhat Agree	16	23.19		
Strongly Agree	49	71.01		
Total	69	100.00		
I like the sound that a stream makes.[z]	3	6	5.63	0.67
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	0	0		
Slightly Disagree	1	1.45		
Slightly Agree	4	5.80		
Somewhat Agree	14	20.29		
Strongly Agree	49	71.01		
Total	68	98.55		

Table 5 Continued

Statement	Min.	Max.	Mean	SD
I like walking through the leaves in the fall.[z]	3	6	5.48	0.78
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	0	0		
Slightly Disagree	2	2.90		
Slightly Agree	6	8.70		
Somewhat Agree	18	26.09		
Strongly Agree	43	62.32		
Total	69	100.00		
Spending time outdoors is an enjoyable alternative to watching TV.[z]	2	6	5.64	0.71
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	1	1.45		
Slightly Disagree	0	0		
Slightly Agree	3	4.35		
Somewhat Agree	15	21.74		
Strongly Agree	50	72.46		
Total	69	100.00		
Family vacations are a good opportunity to spend time outdoors.[z]	3	6	5.64	0.64
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	1	1.45		
Slightly Disagree	0	0		
Slightly Agree	12	17.39		
Somewhat Agree	21	30.43		
Strongly Agree	34	49.28		
Total	68	98.55		
I enjoy eating meals outdoors.[z]	2	6	5.10	1.00
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	1	1.45		
Slightly Disagree	5	7.25		
Slightly Agree	10	14.49		
Somewhat Agree	23	33.33		
Strongly Agree	30	43.48		
Total	69	100.00		
Parental Attitude toward Nature scale	59	90	80.30	7.37

[z]Responses were assigned numerical values such that a response of "Strongly Disagree" scored 1 point, a response of "Somewhat Disagree" scored 2 points, "Slightly Disagree" scored 3 points, "Slightly Agree" scored 4 points, "Somewhat Agree" scored 5 points, and "Strongly Agree" scored 6 points.

[y]Notation of (r) indicates that the numerical value assigned to responses for this question were reverse coded such that a response of "Strongly Disagree" scored 6 points, "Somewhat Disagree" scored 5 points," "Slightly Disagree" scored 4 points, "Slightly Agree" scored 3 points, "Somewhat Agree" scored 2 points, and "Slightly Agree" scored 1 point.

Findings Related to Objective Two

Objective two was to investigate parental attitude toward their child's outdoor recreation. To investigate this, descriptive statistics were used to tabulate the mean score on the Parental Attitude toward Their Child's Outdoor Recreation scale and the mean score on each individual question within the scale.

Parental Attitude toward Their Child's Outdoor Recreation Instrument Scoring

Respondents were asked to indicate a response to 28 statements relating to their attitudes toward their children spending time in outdoor recreation. A six-point Likert-type scale was used (Likert, 1967). Possible responses included "strongly agree," which scored 6 points, "somewhat agree" which scored 5 points, "slightly agree" which scored 4 points, "slightly disagree" which scored 3 points, "somewhat disagree" which scored 2 points, and "strongly disagree" which scored 1 point. Negatively worded statements were reverse coded such that responses disagreeing with the statement scored more points to allow for score accumulation. Non-responses to any question received no points for that question. The cumulative sum of all responses was used as the overall Parental Attitude toward Their Child's Outdoor Recreation score.

Data Analysis

Parental Attitudes toward Their Child's Outdoor Recreation scale scores ranged from 85 to 166. The full possible range of scores was 28 to 168. The mean score for this

scale was 143.28 (*SD* = 16.71). The mean score divided by the number of questions indicated that the mean per each question was 5.12. This indicated that most parents answered statements as either "somewhat agree" or "strongly agree" suggesting that parents reported an overall positive view their child's outdoor recreation (Table 6).

This finding supports past research where mothers reported to recognize the value of outdoor play for their children (Clements, 2004). However, past research suggested that parents' attitudes about the safety of the outdoors would be related to their attitudes about their children playing outdoors (Cahill, 1990; Carver et al., 2008; Louv, 2008; McNeish and Roberts, 1995; Rivkin, 2000; Valentine and McKendrick, 1997). The findings here do not support this research as parents did not express the same degree of concerns about safety in this study compared to past studies.

Table 6. Descriptive statistics indicating frequency of responses to questions on the Parental Attitudes toward Their Child's Outdoor Recreation scale in the study of the relationship between parental attitudes toward nature and the development of fine and gross motor skills in children.

Statement	Min.	Max.	Mean	SD
Playing outside encourages too much aggressive behavior.[z]	1	6	5.64	0.97
	Frequency	Percent		
Strongly Disagree	56	81.16		
Somewhat Disagree	8	11.59		
Slightly Disagree	0	0		
Slightly Agree	2	2.90		
Somewhat Agree	2	2.90		
Strongly Agree	1	1.45		
Total	69	100.00		

Table 6 Continued

Statement	Min.	Max.	Mean	SD
All playgrounds should contain natural element.[y]	2	6	4.94	1.10
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	2	2.90		
Slightly Disagree	5	7.25		
Slightly Agree	16	23.19		
Somewhat Agree	18	26.09		
Strongly Agree	28	40.58		
Total	69	100.00		
Playing outside would be good for my child's health.[y]	4	6	5.80	0.53
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	0	0		
Slightly Disagree	0	0		
Slightly Agree	4	5.80		
Somewhat Agree	6	8.70		
Strongly Agree	59	85.51		
Total	69	100.00		
There is too much crime for my child to play outside.[z]	1	6	4.91	1.36
	Frequency	Percent		
Strongly Disagree	34	49.28		
Somewhat Disagree	13	18.84		
Slightly Disagree	11	15.94		
Slightly Agree	5	7.25		
Somewhat Agree	5	7.25		
Strongly Agree	1	1.45		
Total	69	100.00		
I think my child should go on nature hikes.[y]	2	6	5.29	0.91
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	1	1.45		
Slightly Disagree	1	1.45		
Slightly Agree	12	17.39		
Somewhat Agree	18	26.09		
Strongly Agree	37	53.62		
Total	69	100.00		

Table 6 Continued

Statement	Min.	Max.	Mean	SD
Playing outside is a wasteful way for children to spend their free time.[z]	1	6	5.88	0.64
	Frequency	Percent		
Strongly Disagree	64	92.75		
Somewhat Disagree	3	4.35		
Slightly Disagree	1	1.45		
Slightly Agree	0	0		
Somewhat Agree	0	0		
Strongly Agree	0	0		
Total	68			
My neighborhood is safe enough for children to play outside.[y]	1	6	4.81	1.26
	Frequency	Percent		
Strongly Disagree	2	2.90		
Somewhat Disagree	1	1.45		
Slightly Disagree	10	14.49		
Slightly Agree	6	8.70		
Somewhat Agree	26	37.68		
Strongly Agree	24	34.78		
Total	69	100.00		
I would let my child walk in the rain even if they got wet.[y]	1	6	4.74	1.47
	Frequency	Percent		
Strongly Disagree	4	5.80		
Somewhat Disagree	5	7.25		
Slightly Disagree	1	1.45		
Slightly Agree	12	17.39		
Somewhat Agree	20	28.99		
Strongly Agree	27	39.13		
Total	69	100.00		
My child gets too dirty when playing outside.[z]	1	6	4.42	1.55
	Frequency	Percent		
Strongly Disagree	21	30.43		
Somewhat Disagree	22	31.88		
Slightly Disagree	4	5.80		
Slightly Agree	13	18.84		
Somewhat Agree	5	7.25		
Strongly Agree	4	5.80		
Total	69	100.00		

Table 6 Continued

Statement	Min.	Max.	Mean	SD
I am afraid my child may be harmed by strangers outside.[z]	1	6	3.43	1.55
	Frequency	Percent		
Strongly Disagree	12	17.39		
Somewhat Disagree	5	7.25		
Slightly Disagree	10	14.49		
Slightly Agree	22	31.88		
Somewhat Agree	14	20.29		
Strongly Agree	6	8.70		
Total	69	100.00		
Spending time outdoors is a meaningful family activity.[y]	2	6	5.67	0.74
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	1	1.45		
Slightly Disagree	0	0		
Slightly Agree	5	7.25		
Somewhat Agree	9	13.04		
Strongly Agree	54	78.26		
Total	69	100.00		
I worry that my child will be hurt by gangs if he/she plays outside.[z]	1	6	4.99	1.39
	Frequency	Percent		
Strongly Disagree	38	55.07		
Somewhat Disagree	11	15.94		
Slightly Disagree	8	11.59		
Slightly Agree	6	8.70		
Somewhat Agree	5	7.25		
Strongly Agree	1	1.45		
Total	69	100.00		
My child's learning can be stimulated by outdoor play.[y]	3	6	5.61	0.77
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	0	0		
Slightly Disagree	2	2.90		
Slightly Agree	6	8.70		
Somewhat Agree	9	13.04		
Strongly Agree	52	75.36		
Total	69	100.00		

Table 6 Continued

Statement	Min.	Max.	Mean	SD
Playing outside hurts my child's school grades.[z]	1	6	5.45	1.37
	Frequency	Percent		
Strongly Disagree	53	76.81		
Somewhat Disagree	7	10.14		
Slightly Disagree	1	1.45		
Slightly Agree	1	1.45		
Somewhat Agree	0	0		
Strongly Agree	5	7.25		
Total	67			
Playing outdoors is a good way to improve hand-eye coordination.[y]	4	6	5.68	0.56
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	0	0		
Slightly Disagree	0	0		
Slightly Agree	3	4.35		
Somewhat Agree	16	23.19		
Strongly Agree	49	71.01		
Total	68	98.55		
Other children in my neighborhood are safe for my child to play around.[y]	2	6	5.03	0.98
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	1	1.45		
Slightly Disagree	6	8.70		
Slightly Agree	7	10.14		
Somewhat Agree	30	43.48		
Strongly Agree	24	34.78		
Total	68	98.55		
Children who play outdoors gain confidence.[y]	3	6	5.39	0.83
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	0	0		
Slightly Disagree	2	2.90		
Slightly Agree	9	13.04		
Somewhat Agree	18	26.09		
Strongly Agree	40	57.97		
Total	69	100.00		

Table 6 Continued

Statement	Min.	Max.	Mean	SD
I allow my child to have a wide range of recreational outdoor activities from which to choose.[y]	3	6	5.09	0.90
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	3	4.35		
Slightly Disagree	0	0		
Slightly Agree	16	23.19		
Somewhat Agree	22	31.88		
Strongly Agree	28	40.58		
Total	69	100.00		
I feel that outdoor play interferes too much with my child's homework time.[z]	2	6	5.25	1.00
	Frequency	Percent		
Strongly Disagree	33	47.83		
Somewhat Disagree	22	31.88		
Slightly Disagree	5	7.25		
Slightly Agree	3	4.35		
Somewhat Agree	0	0		
Strongly Agree	2	2.90		
Total	65	94.20		
My child is easier to manage after spending time outside.[y]	2	6	5.06	1.04
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	1	1.45		
Slightly Disagree	5	7.25		
Slightly Agree	14	20.29		
Somewhat Agree	18	26.09		
Strongly Agree	31	44.93		
Total	69	100.00		

Table 6 Continued

Statement	Min.	Max.	Mean	SD
I am afraid my child may be abducted outdoors.[z]	1	6	3.78	1.54
	Frequency	Percent		
Strongly Disagree	11	15.94		
Somewhat Disagree	18	26.09		
Slightly Disagree	5	7.25		
Slightly Agree	19	27.54		
Somewhat Agree	12	17.39		
Strongly Agree	4	5.80		
Total	69	100.00		
I let my child make mud pies.[y]	1	6	4.78	1.31
	Frequency	Percent		
Strongly Disagree	2	2.90		
Somewhat Disagree	3	4.35		
Slightly Disagree	5	7.25		
Slightly Agree	13	18.84		
Somewhat Agree	19	27.54		
Strongly Agree	25	36.23		
Total	67	100.00		
Taking part in outdoor recreation improves my child's communication skills.[y]	1	6	5.00	1.33
	Frequency	Percent		
Strongly Disagree	1	1.45		
Somewhat Disagree	2	2.90		
Slightly Disagree	5	7.25		
Slightly Agree	11	15.94		
Somewhat Agree	16	23.19		
Strongly Agree	34	49.28		
Total	69	100.00		
Outdoor activities over stimulate my child.[z]	1	6	5.00	1.33
	Frequency	Percent		
Strongly Disagree	36	52.17		
Somewhat Disagree	14	20.29		
Slightly Disagree	8	11.59		
Slightly Agree	6	8.70		
Somewhat Agree	4	5.80		
Strongly Agree	1	1.45		
Total	69	100.00		

Table 6 Continued

Statement	Min.	Max.	Mean	SD
Taking part in outdoor activities helps to build up my child's level of independence.[y]	3	6	5.52	0.72
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	0	0		
Slightly Disagree	2	2.90		
Slightly Agree	3	4.35		
Somewhat Agree	21	30.43		
Strongly Agree	43	62.32		
Total	69	100.00		
I would let my child play in a sand box.[y]	1	6	5.55	0.95
	Frequency	Percent		
Strongly Disagree	1	1.45		
Somewhat Disagree	0	0		
Slightly Disagree	2	2.90		
Slightly Agree	6	8.70		
Somewhat Agree	8	11.59		
Strongly Agree	52	75.36		
Total	69	100.00		
Outdoor activities are a good way for my child to make friends.[y]	4	6	5.61	0.65
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	0	0		
Slightly Disagree	0	0		
Slightly Agree	6	8.70		
Somewhat Agree	15	21.74		
Strongly Agree	48	69.57		
Total	69	100.00		
Participating in outdoor play is a good way for my child to get exercise.[y]	4	6	5.85	0.43
	Frequency	Percent		
Strongly Disagree	0	0		
Somewhat Disagree	0	0		
Slightly Disagree	0	0		
Slightly Agree	2	2.90		
Somewhat Agree	6	8.70		
Strongly Agree	60	86.96		
Total	68	98.55		

Table 6 Continued

Statement	Min.	Max.	Mean	SD
Parental Attitude toward Their Child's Outdoor Recreation scale	85	166	143.28	16.71

[z]The numerical value assigned to responses for this question were reverse coded such that a response of "Strongly Disagree" scored 6 points, "Somewhat Disagree" scored 5 points," "Slightly Disagree" scored 4 points, "Slightly Agree" scored 3 points, "Somewhat Agree" scored 2 points, and "Slightly Agree" scored 1 point.

[y]Responses were assigned numerical values such that a response of "Strongly Disagree" scored 1 point, a response of "Somewhat Disagree" scored 2 points, "Slightly Disagree" scored 3 points, "Slightly Agree" scored 4 points, "Somewhat Agree" scored 5 points, and "Strongly Agree" scored 6 points.

Findings Related to Objective Three

Objective three was to investigate the relationship between parental attitudes toward nature and parental attitudes toward their child's outdoor recreation.

Data Analysis

Correlations are used to determine the relationship between two variables. A correlation coefficient can range from -1.00 to +1.00. The stronger the relationship between two variables, the further the correlation coefficient will be from 0 (Coolidge, 2006). A Pearson's product-moment correlation analyzed the relationship between scores of respondents on Parental Attitude toward Nature scale and the Parental Attitude toward Their Child's Outdoor Recreation scale. A statistically significant correlation was found between the two sets of scores on the scales ($r = 0.63$, $P < 0.01$) (Figure 1).

This finding supports the first hypothesis and indicates that within this sample of parents, those who had more positive attitudes about nature also had more positive attitudes about their children spending time outdoors. This finding supports past research that found that children spent more time in outdoor recreation when they had

parents who also spent more time in outdoor recreation (Beets et al., 2007). This finding also supports research that found that parental attitudes had a strong influence on their children's activities (Brown, 1990; Collins et al., 2000; Hutchinson and Baldwin, 2005).

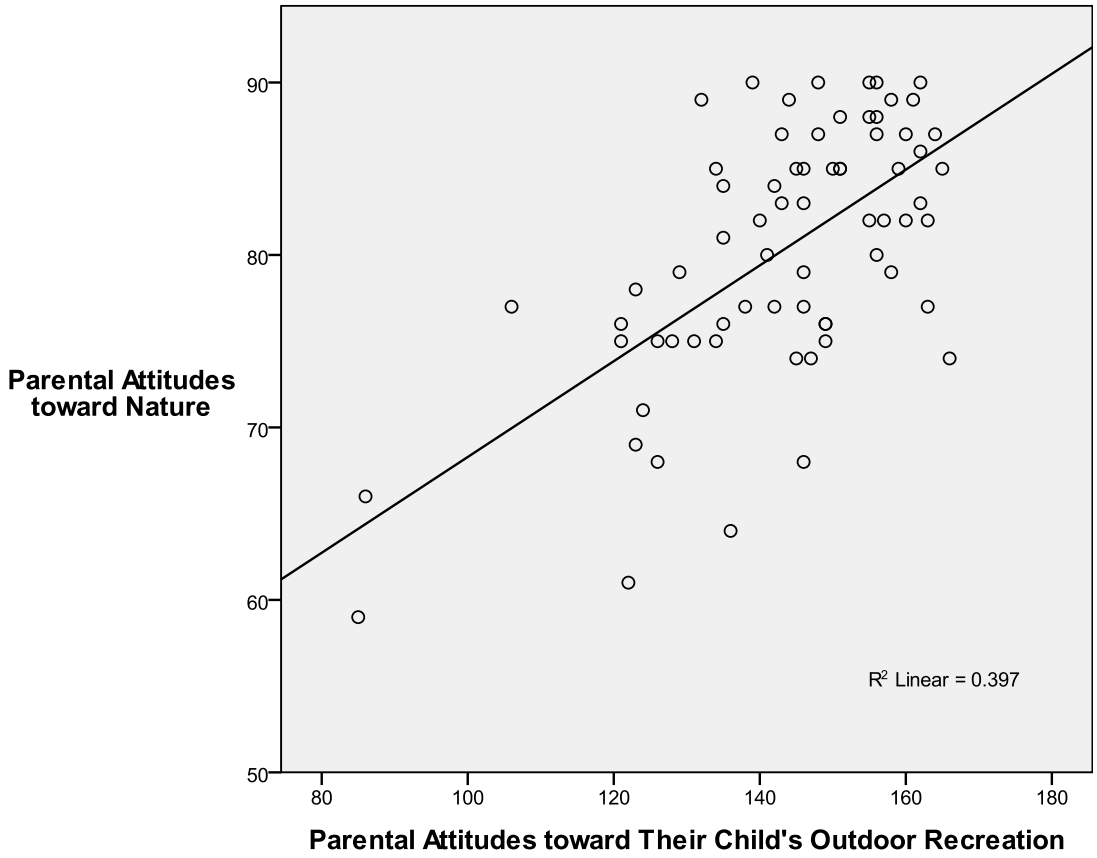

Figure 1. Relationship between the Parental Attitude toward Nature scale scores and Parental Attitudes Toward their Child's Outdoor Recreation scale score in the study of the relationship between parental attitude toward nature and the development of fine and gross motor skills in children.

Findings Related to Objective Four

Objective four was to investigate the relationship between the amounts of time spent in outdoor activities and the development of fine and gross motor skills in young children.

Instrument Scoring

A section of the questionnaire asked parents to indicate the amount of time their child spent on average each day in various types of activities. Specifically, parents were asked to respond to the following questions: "How much time per day does your child spend outdoors in free play at home on average?," "How much time per day does your child spend outdoors in organized activities or sports on average?," How much time per day does your child spend indoors in organized activities or sports?," "How much time per day does your child spend indoors on video games and watching TV?," and "How much time per day does your child spend indoors on free play not including time spent playing video games or watching TV?". Possible responses included, "None," "Less than 30 minutes," "30 minutes to 1 hour," "1 to 2 hours," and "2 or more hours." This section was coded such that a response of "None" resulted in 1 point, "Less than 30 minutes" resulted in 2 points, "30 minutes to 1 hour" resulted in 3 points, "1 to 2 hours" resulted in 4 points, "and 2 or more hours" resulted in 5 points.

In response to the statement, "How much time per day does your child spend outdoors in free play at home on average?," 1 (1.4%) parent responded "None," 9 (13.0%) responded "Less than 30 minutes," 31 (44.9%) responded "30 minutes to 1 hour," 23 (33.3%) responded "1 to 2 hours," and 5 (7.2%) responded "2 or more hours."

In response to the statement, “How much time per day does your child spend outdoors in organized activities or sports on average?,” 16 (23.3%) parents responded “None,” 16 (23.3%) responded “Less than 30 minutes,” 24 (34.8%) responded “30 minutes to 1 hour,” 12 (17.4%) responded “1 to 2 hours,” and 1 (1.4%) responded “2 or more hours.” In response to the statement, “How much time per day does your child spend indoors in organized activities or sports on average?,” 12 (17.4%) parents responded “None,” 9 (13.0%) responded “Less than 30 minutes,” 19 (27.5%) responded “30 minutes to 1 hour,” 10 (14.5%) responded “1 to 2 hours,” and 17 (24.6%) responded “2 or more hours.” In response to the statement, “How much time per day does your child spend indoors on video games or watching TV on average?,” 5 (7.2%) parents responded “None,” 20 (29.0%) responded “Less than 30 minutes,” 22 (31.9%) responded “30 minutes to 1 hour,” 17 (24.6%) responded “1 to 2 hours,” and 5 (7.2%) responded “2 or more hours.” In response to the statement, “How much time per day does your child spend indoors in free play on average?,” 0 (0.0%) parents responded “None,” 0 (0.0%) responded “Less than 30 minutes,” 13 (18.8%) responded “30 minutes to 1 hour,” 27 (39.1%) responded “1 to 2 hours,” and 29 (42.0%) responded “2 or more hours” (Figure 2). It may make sense that children of this age group (ages 3-5) were restricted in their outdoor play. Also, since this sample is drawn from southeast and central Texas, the climate may also explain their restricted time outdoors with extremes between heat and cold without many days of comfortable outdoor temperatures. However, past research has indicated that children are spending reduced time outdoors (Clements, 2004;

Hofferth and Sandberg, 2001) and the sample in this study seemed to support those findings.

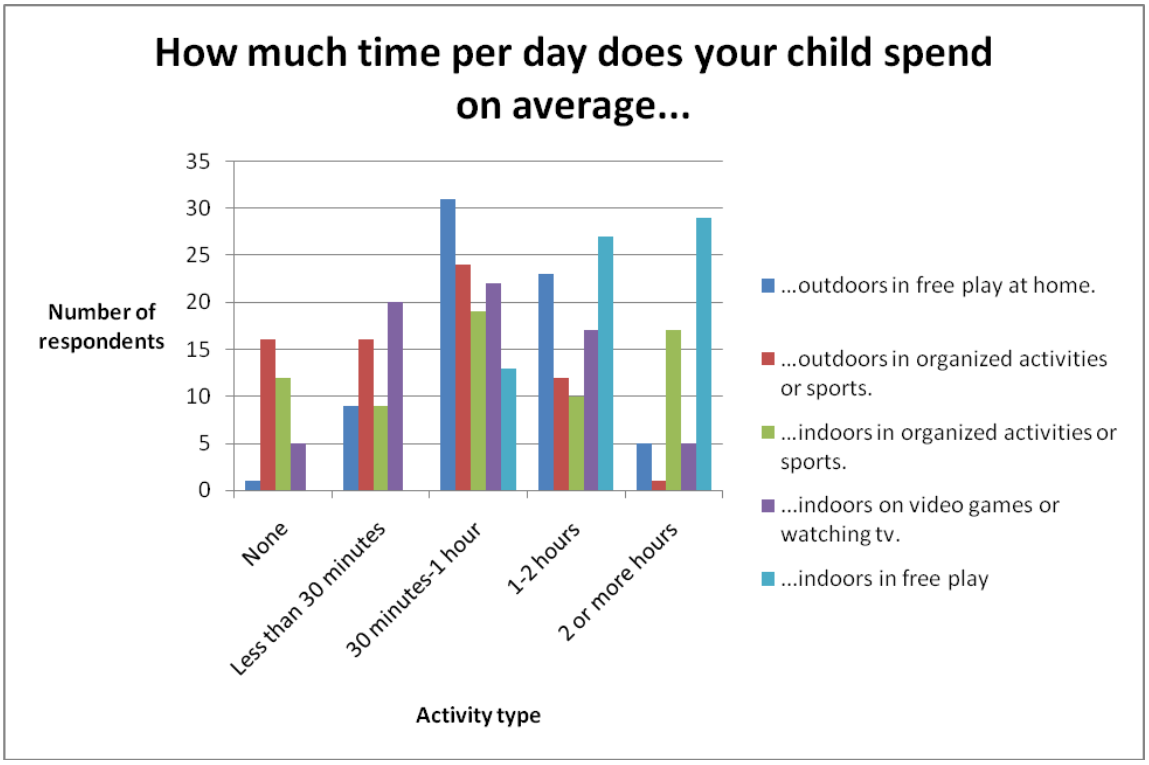

Figure 2. Number of respondents in each time group for indoor and outdoor activity types in the study of the relationship between parental attitude toward nature and the development of fine and gross motor skills in children.

Data Analysis

To understand the relationship between the amounts of time spent in various types of activities and overall, fine, and gross motor scores, a series of Pearson product-moment correlations were calculated. No statistically significant correlations were found in respect to the outdoor activities investigated. However, the overall motor skill

Z-score and the fine motor skill Z-score were both statistically significantly correlated with indoor organized sports or activities (r = +0.314, *P* = 0.026; r = +0.246, *P* = 0.046). This indicated that the overall motor skill Z-scores and the fine motor skill Z-scores tended to increase as parents reported increasing levels of time spent in indoor organized sports or activities. The overall motor skill Z-scores and the fine motor skill Z-scores were also statistically significantly correlated with indoor video game and television time (r = +0.314, *P* = 0.026; r = +0.241, *P* = 0.045), which indicated that as parents reported more time spent watching television or playing video games, overall motor skill scores and fine motor skill scores tended to increase. Additionally, gross motor skill Z-scores were statistically significantly negatively correlated with indoor free play, not including video games and watching tv (r = -0.259, *P* = 0.032). This result indicated that as parents reported that their children spent increasing amounts of time spent in indoor free play not including playing video games or watching television, their gross motor scores tended to decrease (Table 7).

The findings in this objective suggest mixed support for past research. The findings here do not suggest that increased outdoor play improves motor coordination as suggested by Grahn et al. (1997) and Fjortoft (2004). However, these findings do suggest that decreased indoor play would relate to improved motor coordination which would indirectly support the findings by Grahn et al. (1997) and Fjortoft (2004). This research also does not support the finding that increased television or video game time would relate to poor motor development as suggested by Graf et al. (2004), although indoor play does not seem to improve gross motor skills. These findings do support

research that suggests video game playing improves fine motor skills (Griffith et al., 1983; Rosser et al., 2007).

Table 7. Correlation matrix indicating the Pearson's product-moment correlation between overall motor skill Z-score, gross motor skill Z-score, and fine motor skill Z-score, and time spent in various outdoor and indoor activities in the study of the relationship between parental attitude toward nature and the development of fine and gross motor skills in children.

How many hours per day does your child spend…		Overall motor skills Z-score	Gross motor skills Z-score	Fine motor skills Z-score
…outdoors in free play at home on average?	Pearson correlation	-0.171	-0.153	-0.084
	P	.161	0.210	0.494
	N	69	69	69
…outdoors in organized activities or sports on average?	Pearson correlation	0.103	-0.089	0.150
	P	0.401	0.469	0.219
	N	69	69	69
…indoors on organized sports or activities?	Pearson correlation	0.314*	0.075	0.246*
	P	0.026	0.356	0.046
	N	69	69	69
…indoors on video games or watching tv?	Pearson correlation	0.269*	0.113	0.241*
	P	0.026	0.356	0.045
	N	67	67	67
…indoors on free play not including video games or watching tv?	Pearson correlation	-0.142	-0.259*	-0.028
	P	0.243	0.032	0.822
	N	69	69	69

*Statistically significant at the 0.05 level.

Findings Related to Objective Five

Objective five was to investigate the relationship between time spent in various activities with parental attitude toward nature and attitude toward their child's outdoor recreation.

Data Analysis

A multivariate analysis of variance (MANOVA) was used to compare the mean scores of parents who responded in each activity time group category to investigate if a difference in scores on these scales might indicate a difference in how parents allot their children's time in different activities.

Statistically significant differences were found with regards to parental attitude toward their child's outdoor recreation in several activity types including outdoors in free play ($P = 0.025$), outdoors organized sports and activities ($P = 0.037$), indoors playing video games and watching television ($P = 0.007$) and indoor free play ($P = 0.026$). No statistically significant differences were found with regards to the Parental Attitude toward Nature scale (Table 8).

Table 8. Multivariate analysis of variance indicating the mean scores on the Parental Attitude toward Nature scale and the Parental Attitude toward Their Child's Outdoor Recreation based on the time they report their children spending in various activities in the study of the relationship between parental attitude toward nature and the development of fine and gross motor skills in children.

Activity type	Attitudinal scale	df	F	*P*
…outdoors in free play at home on average	Parental Attitude toward Nature	3	2.330	0.174

Table 8 Continued

Activity type	Attitudinal scale	df	F	*P*
	Parental Attitude toward Their Child's Outdoor Recreation	3	6.543	0.025*
…outdoors in organized activities or sports on average	Parental Attitude toward Nature	3	1.545	0.297
	Parental Attitude toward Their Child's Outdoor Recreation	3	5.493	0.037*
…indoors on organized sports or activities?	Parental Attitude toward Nature	3	1.077	0.427
	Parental Attitude toward Their Child's Outdoor Recreation	3	1.716	0.262
…indoors on video games or watching tv?	Parental Attitude toward Nature	4	1.898	0.230
	Parental Attitude toward Their Child's Outdoor Recreation	4	10.490	0.007*
…indoors on free play not including video games or watching tv?	Parental Attitude toward Nature	2	2.575	0.156
	Parental Attitude toward Their Child's Outdoor Recreation	2	7.091	0.026*

*Statistically significant at the 0.05 level.

Post-hoc tests with a Bonferroni correction were used to analyze where the differences existed in the MANOVA. For outdoor free play, only one participant responded "None." To allow for analysis, this category was combined with the "Less than 30 minutes" category. Statistically significant differences were found between the "Less than 30 minute" category and the "30 minutes to 1 hour," "1 to 2 hours," and "2 or

more hours" categories. All other comparisons were not statistically significantly different. This indicated that the parents who responded that their children played outdoors in free play for less than 30 minutes each day, also had a lower mean score on the Parents' Attitudes toward Their Child's Outdoor Recreation when compared to parents who responded that their children played outdoors in free play for 30 minutes or more each day (Table 9).

This finding offers support of past research that found that children spent more time in outdoor recreation when they had parents who also spent more time in outdoor recreation (Beets et al., 2007). This finding also supports research that found that parental attitudes had a strong influence on their children's activities (Brown, 1990; Collins et al., 2000; Hutchinson and Baldwin, 2005).

Table 9. Descriptive statistics of the Parental Attitude toward Their Child's Outdoor Recreation scale grouped by outdoor free play response categories for post-hoc analysis in the study of the relationship between parental attitude toward nature and the development of fine and gross motor skills in children.

Time	N	Minimum	Maximum	Mean	SD
None[z]	-	-	-	-	-
Less than 30 minutes	10	85	149	124.50*	16.20
30 minutes to 1 hour	31	86	165	144.68	15.05
1 to 2 hours	23	106	166	147.04	15.20
2 or more hours	5	145	163	154.80	6.42

*Statistically significant at the 0.05 level with a Bonferroni correction applied.
[z]There was only one participant in the none category. For the purposes of post-hoc analysis, this category was combined with the less than 30 minutes category.

Findings Related to Objective Six

Objective six was to investigate the relationship between parental attitude toward nature and their child's outdoor recreation and the development of fine and gross motor skills in their children.

Data Analysis

Pearson's product-moment correlations were calculated to investigate the relationship between scores on the Parental Attitude toward Nature scale, Parental Attitude toward Their Child's Outdoor Recreation, and their child's overall, fine, and gross motor skill Z-scores. No statistically significant correlations were found (Table 10). This indicated that there was no evidence supporting any relationship between parental attitude toward nature, parental attitude toward their child's outdoor recreation and their children's overall, fine, or gross motor skill scores which offers no support for hypothesis two.

This finding offers no support of past research that suggested that parental attitudes would influence children's activities, which would influence motor skill development (Beets et al., 2007; Brown, 1990; Collins et al., 2000; Fjortoft, 2004; Grahn et al., 1997; Hutchinson and Baldwin, 2005).

Table 10. Correlation matrix indicating the Pearson's product-moment correlation between overall motor skill Z-score, gross motor skill Z-score, and fine motor skill Z-score, and scores on the Parental Attitude toward Nature scale and the Parental Attitude toward Their Child's Outdoor Recreation scale in the study of the relationship between parental attitude toward nature and the development of fine and gross motor skills in children.

Scale		Overall motor skill Z-score	Gross motor skill Z-score	Fine motor skill Z-score
Parental Attitude toward Nature	Pearson correlation	-0.031	-0.066	-0.004
	P	0.798	0.590	0.975
	N	69	69	69
Parental Attitude toward Their Child's Outdoor Recreation	Pearson correlation	-0.092	0.060	-0.129
	P	0.453	0.622	0.291
	N	69	69	69

*Statistically significant at the 0.05 level.

Findings Related to Objective Seven

Objective seven was to compare parental preferences for play areas based on the natural and artificial elements of the setting.

Instrument Scoring

Photographs of Play Area Section. Respondents were asked to rate six photographs with regards to the statement, "I feel completely comfortable allowing my child to play in an area like this with appropriate supervision," on a six-point Likert-type scale (Likert, 1967). The six pictures that were included had play areas which ranged from completely natural (no man-made structures visible) to completely artificial (indoor play environment, no natural elements visible). Possible responses included "strongly

agree," which scored 6 points, "somewhat agree" which scored 5 points, "slightly agree" which scored 4 points, "slightly disagree" which scored 3 points, "somewhat disagree" which scored 2 points, and "strongly disagree" which scored 1 point.

Data Analysis. A Repeated Measures ANOVA was conducted to compare parents' mean preference for play area responses between the 1.) wild, very natural photograph, 2.) the outdoor photograph with trees, bench and chain-link fence, 3.) the outdoor fenced-in photograph with gravel and nearby trees, 4.) the outdoor photograph with hard blacktop surface, 5.) the indoor photograph of a gaming room, and 6.) the indoor photograph of a play area with a slide and tunnels (Appendix A). Statistically significant differences ($P = 0.001$) were found indicating differences in preferences for outdoor play areas based on the natural and artificial elements of the settings (Table 11).

Table 11. Repeated Measures Analysis of Variance analyzing parental preferences for play areas in the study of the relationship between parents' attitudes about nature and the development of fine and gross motor skills in children.

Picture type	Sample size	Mean response	SD	df	F	*P*
Wild, very natural	69	4.80	1.47	5	18.39	0.001*
Outdoor area with trees, bench, and chain link fence	69	5.46	1.01			
Outdoor play area fenced in with gravel and nearby trees	68	5.56	0.80			
Outdoor play area with black hardtop surface and trees in the background	69	4.77	1.44			
Indoor game room	69	3.90	1.61			
Indoor play area with slide and tunnels	69	4.72	1.47			

*Statistically significant at the 0.05 level.

Pairwise comparisons with a Bonferroni correction were applied to investigate where the differences in play area preferences were observed (Table 12). These comparisons indicated that all outdoor play areas scored statistically significantly higher when compared to the indoor game room (all *P*'s > 0.05). The wild, very natural picture scored statistically significantly lower when compared to the outdoor area with trees, benches, and a chain link fence and the outdoor play area that was fenced in with gravel and nearby trees (all *P*'s > 0.05). The indoor play area with a slide and tunnels scored statistically similarly to the wild, very natural image, but statistically significantly different when compared to the outdoor area with trees, benches, and a chain link fence and the outdoor play area that was fenced in with gravel and nearby trees (*P*'s > 0.05). This indicated that, in general, parents in this population preferred their children to play in managed outdoor environments with some incorporated natural elements. This finding supports research by Kuo et al. (1997) and Taylor et al. (1998) that found that areas with some natural elements such as trees had more children playing in them.

Table 12. Descriptive statistics indicating mean responses on the parental preferences for play areas for post-hoc analysis in the study of the relationship between parental attitude toward nature and the development of fine and gross motor skills in children.

Picture type	N	Minimum	Maximum	Mean	SD
Indoor game room[z]	69	1	6	3.90	1.61
Indoor play area with slide and tunnels[y]	69	1	6	4.72	1.47

Table 12 Continued

Picture type	N	Minimum	Maximum	Mean	SD
Outdoor play area with black hardtop surface and trees in background[y]	69	1	6	4.77	1.44
Wild, very natural[y]	69	1	6	4.80	1.47
Outdoor with trees, benches, and chain link fence[x]	69	1	6	5.46	1.01
Outdoor play area fenced in with gravel and nearby trees[x]	68	1	6	5.56	0.80

[z-x]Categories with the same letter are statistically similar to each other, and statistically significantly different from each other at the 0.05 level.

CHAPTER V

SUMMARY AND CONCLUSIONS

This chapter summarizes, presents conclusions for this research and makes recommendations for future investigation. The purpose of this study was to investigate the relationship between parental attitude toward nature and the development of fine and gross motor skills in young children.

Objectives

The specific objectives of this study were:

1. To investigate parental attitude toward nature.
2. To investigate parental attitude toward their child's outdoor recreation.
3. To investigate the relationship between parental attitude toward nature and parental attitude toward their child's outdoor recreation.
4. To investigate the relationship between the amounts of time spent in outdoor activities and the development of fine and gross motor skills in young children.
5. To investigate the relationship between time spent in various activities with parental attitudes toward nature and attitude toward their child's outdoor recreation.
6. To investigate the relationship between parental attitude toward their child's outdoor recreation and the development of fine and gross motor skills in their children.

7. To compare parental preferences for play areas based on the natural and artificial elements of the setting.

The following hypotheses will be tested:

H1: Parents who have positive attitudes toward nature will have more positive attitudes toward their child's outdoor recreation.

H2: Children whose parents have more positive attitudes toward their outdoor recreation will have better scores on motor development tests.

Results

Parental Attitude, Time Spent Outdoors, and the Development of Fine and Gross Motor Skills

Results from this research showed that mean scores for both the Parental Attitude toward Nature scale and the Parental Attitude toward Their Child's Outdoor Recreation scale were high, indicating that most respondents reported a positive view about nature and their child's outdoor recreation. Also, a strong positive relationship was found between the Parental Attitude toward Nature scale and the Parental Attitude toward Their Child's Outdoor Recreation scale, revealing that parents who had a positive view about nature also had a positive view of their child's outdoor recreation.

Parental Attitude toward Nature score was not related to the time children spent in any indoor or outdoor activity. However, Parental Attitude toward Their Child's Outdoor Recreation score was statistically significantly related to the amount of time their children spent outdoors in free play at home on average and outdoors in organized activities or sports on average. Specifically, parents who responded that their children

played outdoors in free play for less than 30 minutes each day, also had a lower mean score on the Parents' Attitudes toward Their Child's Outdoor Recreation when compared to parents who responded that their children played outdoors in free play for 30 minutes or more each day. Furthermore, the parents who reported that their children spent no time in outdoor organized activities or sports had a higher mean score on the Parental Attitude toward Their Child's Outdoor Recreation scale when compared to parents who responded that their children played outdoors in organized activities or sports less than 30 minutes each day. However, parents who reported more than 30 minutes of time in this activity each day did not differ from any other category. This finding might indicate that parents who had higher scores on the Parental Attitude toward Their Child's Outdoor Recreation preferred for their children to participate in free play outdoors as opposed to organized outdoor activities. This finding supports past research that found that children spent more time in outdoor recreation when they had parents who also spent more time in outdoor recreation (Beets et al., 2007). This research also supports studies that found that parental attitudes had a strong influence on their children's activities (Brown, 1990; Collins et al., 2000; Hutchinson and Baldwin, 2005).

The amount of time parents reported their children spending in various activities also had some statistically significant relationships with overall, fine, and gross motor skill scores reported by the childcare centers. The time spent in outdoor activities was not statistically significant with the either overall, fine, or gross motor skill scores. However, the time spent in indoor organized sports and activities and the time spent indoors playing video games and watching tv were statistically significantly positively

related to the overall and fine motor skill scores. The amount of time spent indoors in free play was statistically significantly negatively correlated with the gross motor skill scores. This indicated that children who spent more time indoors had better developed fine motor skills but lesser developed gross motor skills. The findings in this research study offer mixed support for past research. The findings do not suggest that increased outdoor play improves motor coordination as suggested by Grahn et al. (1997) and Fjortoft (2004). However, these findings do suggest that decreased indoor play would relate to improved motor coordination which would indirectly support the findings by Grahn et al. (1997) and Fjortoft (2004). This research also does not support the finding that increased television or video game time would relate to poor motor development as suggested by Graf et al. (2004), although indoor play does not seem to improve gross motor skills. These findings do support research that suggests video game playing improves fine motor skills (Griffith et al., 1983; Rosser et al., 2007).

Parental Preferences for Play Areas

This research found a relationship between the degree of natural and artificial elements of a play area and parents' preferences for the play area. For example, the indoor photograph of the game room, which contained no natural elements, was preferred less by the parents when compared with any of the outdoor photographs. Also the wild natural photograph, the photograph with trees, a bench and a chain link fence, and the outdoor fenced-in photograph with gravel and nearby trees were all rated higher than the outdoor photograph which contained a black hardtop surface with few near-by natural elements. Parents seemed to indicate being more comfortable with their children

playing outdoors when compared to indoor settings, and they preferred areas with more natural settings when compared to settings with more man-made surroundings. However, this comfort was limited to those settings that were clearly constructed as the completely wild outdoor photograph was the least preferred play area when compared to other outdoor play settings. This finding supports research by Kuo et al. (1997) and Taylor et al. (1998) that found that areas with some natural elements such as trees had more children playing in them.

Conclusions

The following conclusions were made from this research:

1. Results from this study indicated that parents had positive views toward nature.
2. Results from this study indicated that parents had positive views towards their child's outdoor recreation.
3. Parents who had more positive views toward nature also tended to have more positive views toward their child's outdoor recreation.
4. Children who spent more time indoors in organized sports or activities or playing video games and watching television had higher overall and fine motor skill scores.
5. Children who spent more time indoors in free play had lower gross motor skill scores.

6. Parents who scored better on the Parental Attitude toward Their Child's Outdoor Recreation scale reported that their child spent more time in outdoor free play and outdoor organized sports and activities.
7. Parents preferred outdoor play spaces when compared to indoor play spaces.
8. Parents preferred outdoor play areas that were constructed but had more nearby natural components.

Recommendations for Additional Research

The following recommendations for additional research were made:

1. It is recommended that this study be replicated with a more quantitative motor skill test with more variation in scores or administered independently to ensure rater reliability.
2. It is recommended that this study be replicated in different climates to investigate the impact of weather patterns on the quantity of time children spend outdoors.
3. It is recommended that this study be replicated with older children to investigate the impact of age, time spent outdoors, and motor skill development.
4. Play areas including images of differing seasons should be investigated to understand any influence on parental preferences based on seasonal variation.

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APPENDIX A

CONSENT FORM

This appendix includes a copy of the consent form used in this study.

Consent Form

Dear Parent/Guardian,

I am writing to ask your help in a research study on children being conducted as a part of my doctoral dissertation. You have been chosen to take part in this research study because your child attends the university child development center. This study is part of an effort to learn about parents' attitudes about the outdoors and how these attitudes impact their children's motor skills. Graduate student Amy McFarland and Dr. Jayne Zajicek from Texas A&M University and Dr. Tina Marie Cade from Texas State University are conducting this study. You can reach them to ask questions about the study at (979) 845-4482 or (512) 245-3324. Their e-mail addresses are am1432@tamu.edu, j-zajicek@tamu.edu , and tc10@txstate.edu.

This survey is voluntary. You can either choose to take part in the study or not. You can quit the study at any time. You may choose to not answer any question. If you decide not to participate or to answer a question, there will be no consequence to you.

If you do wish to take part in the study, please fill out the bottom of this sheet and the attached survey. It should take about 30 minutes. The survey asks questions about how you feel about the outdoors. It also asks about allowing your child to play outdoors. There are also questions asked about you and your child to determine if some children benefit more or less from playing outdoors. We are targeting specific age groups of children, so please only respond about the child who this packet was sent home with, even if you have more than 1 child enrolled at the university child care center.

In order to complete our study, we also need to ask your permission to access your child's motor test scores. The university child development center currently makes observations about motor skills development. We are not asking your child to take a test or undergo additional observation. We are only asking for permission to view the observations already made by the university children's center.

By knowing more about your child's motor skills, we can give advice about whether children should spend more or less time outdoors.

Your answers are completely confidential. Results from this study will be released only as summaries. No individual's answers can be identified. Your child's information will also be kept completely confidential. If you would like a copy of our summary, please contact us. Your responses will be kept completely confidential, and in no way will your responses be used to determine any program benefits.

Once we receive your completed questionnaire and consent form, we will match your responses to your child's motor skill observations, and then remove your identifying information from your responses. All identifying information will be removed from our database.

While you may feel uncomfortable answering questions, please remember that all information is kept completely confidential. In no way are the researchers forming opinions about you or your child. We are simply using the information we gain to find out how playing outdoors effects children's development. You can help us very much by taking a few minutes to share your opinions.

Ms. McFarland, Dr. Zajicek, and Dr. Cade will lock all information in a cabinet at Texas A&M University. We will destroy it after five years. We have enclosed a small token of appreciation as a way of saying thanks for your help.

Please be sure you have read the above information, asked questions, and received answers to your satisfaction. By signing below, you consent to take part in the study.

Again, thank you very much for helping with this important study.

Sincerely,

Amy McFarland	Jayne M. Zajicek	Tina Marie (Waliczek) Cade
Doctoral Candidate	Texas A&M University	Texas State University

P.S. We have enclosed a wildflower seed packet as a way of saying thank you for your help in this important research. You may keep the seeds even if you decide to not participate in this study.

Texas A&M University IRB Approval Number: 2009-0056
Texas State University IRB Approval Number: 2009O9573

Please fill out and return this form with the attached survey. **Keep the other copy.**

I have read and understand the paragraphs above. All of my questions have been answered. I wish to take part in this study.

Child's Name: _____

Parent or Guardian Signature: _____

Date: _____

Please respond only about the child this packet was sent home with even if you have more than one child enrolled at the child development center.

If you have questions about the research, your rights as a participant, and/or research-related injuries you may contact the Texas State University IRB chair, Dr. Jon Lasser (512-245-3413 – lasser@txstate.edu), or Ms. Becky Northcut, Compliance Specialist (512-245-2102).

APPENDIX B

INSTRUMENT

This appendix includes a copy of the instrument used in this study.

Outdoor Attitudes

Questionnaire

Instructions

Dear Parent/Guardian,

Enclosed in this packet you will find several forms:

1) Consent Form – You will find 2 copies of this form. One copy is for your records, and the other must be signed and returned. We ask that you sign return this form to us even if you do not wish to participate. Doing so will ensure we do not contact you again.

2) Outdoor Attitudes Questionnaire – Please fill this out and return. It will take approximately 20 to 30 minutes to complete.

3) Wildflower Seed Packet – This is for you. Please keep as a gift and token of appreciation of you as a parent, even if you choose not to participate.

Things to return in the brown envelope:

1) One signed Consent Form (even if you choose to not participate)

2) Completed Outdoor Attitudes Questionnaire

Thank you!

P.S. Please respond only about the child this packet was sent home with even if you have more than one child enrolled at the child development center.

Part I:

Attitudes About Nature

INSTRUCTIONS: Please rate how strongly you agree or disagree with each of the following statements by placing a check mark in the appropriate box. Please use the following scale:

1=Strongly Disagree
2=Somewhat Disagree
3=Slightly Disagree
4=Slightly Agree
5=Somewhat Agree
6=Strongly Agree

		1	2	3	4	5	6
1.	I really enjoy nature.						
2.	I enjoy watching the sky on summer nights.						
3.	I enjoy pictures of birds and animals.						
4.	I like sitting beside a quiet pond.						
5.	Walking in the woods is a **waste** of time.						
6.	I wish I knew more about nature						

Next Page

INSTRUCTIONS: Please rate how strongly you agree or disagree with each of the following statements by placing a check mark in the appropriate box. Please use the following scale:

1=Strongly Disagree
2=Somewhat Disagree
3=Slightly Disagree
4=Slightly Agree
5=Somewhat Agree
6=Strongly Agree

		1	2	3	4	5	6
7.	People should spend more time outside.						
8.	I like TV programs about nature.						
9.	I would like to vacation in a cabin in the woods.						
10.	I feel good when I am close to nature.						
11.	I like the sounds that a stream makes.						
12.	I like walking through the leaves in the fall.						

INSTRUCTIONS: Please rate how strongly you agree or disagree with each of the following statements by placing a check mark in the appropriate box. Please use the following scale:

1=Strongly Disagree
2=Somewhat Disagree
3=Slightly Disagree
4=Slightly Agree
5=Somewhat Agree
6=Strongly Agree

		1	2	3	4	5	6
13.	Spending time outdoors is an enjoyable alternative to watching TV.						
14.	Family vacations are a good opportunity to spend time outdoors.						
15.	I enjoy eating meals outdoors.						

Next Page 

Part II:

Your Children Spending Time Outdoors

INSTRUCTIONS: Please rate how strongly you agree or disagree with each of the following statements by placing a check mark in the appropriate box. Please use the following scale:

1=Strongly Disagree
2=Somewhat Disagree
3=Slightly Disagree
4=Slightly Agree
5=Somewhat Agree
6=Strongly Agree

		1	2	3	4	5	6
16.	Playing outside encourages **too much** aggressive behavior.						
17.	All playgrounds should contain natural elements.						
18.	Playing outside would be good for my child's health.						
19.	There is **too much** crime for my child to play outside.						
20.	I think my child should go on nature hikes.						

INSTRUCTIONS: Please rate how strongly you agree or disagree with each of the following statements by placing a check mark in the appropriate box. Please use the following scale:

1=Strongly Disagree
2=Somewhat Disagree
3=Slightly Disagree
4=Slightly Agree
5=Somewhat Agree
6=Strongly Agree

		1	2	3	4	5	6
21.	Playing outside is a **wasteful** way for children to spend their free time.						
22.	My neighborhood is safe enough for children to play outside.						
23.	I would let my child walk in the rain even if they got wet.						
24.	My child gets **too dirty** when playing outside.						

Next Page 

INSTRUCTIONS: Please rate how strongly you agree or disagree with each of the following statements by placing a check mark in the appropriate box. Please use the following scale:

1=Strongly Disagree
2=Somewhat Disagree
3=Slightly Disagree
4=Slightly Agree
5=Somewhat Agree
6=Strongly Agree

		1	2	3	4	5	6
25.	I am **afraid** my child may be harmed by strangers outside.						
26.	Spending time outdoors is a meaningful family activity.						
27.	I worry that my child will be **hurt** by gangs if he/she plays outside.						
28.	My child's learning can be stimulated by outdoor play.						
29.	Playing outdoors is **hurts** my child's school grades.						
30.	Playing outdoors is a good way to improve hand-eye coordination.						

INSTRUCTIONS: Please rate how strongly you agree or disagree with each of the following statements by placing a check mark in the appropriate box. Please use the following scale:

1=Strongly Disagree
2=Somewhat Disagree
3=Slightly Disagree
4=Slightly Agree
5=Somewhat Agree
6=Strongly Agree

		1	2	3	4	5	6
31.	Other children in my neighborhood are safe for my child to play around.						
32.	Children who play outdoors gain confidence.						
33.	I allow my child to have a wide range of recreational outdoor activities from which to choose.						
34.	I feel that outdoor play interferes **too much** with my child's homework time.						
35.	My child is easier to manage after spending time outside.						
36.	I am **afraid** my child may be abducted outdoors.						
37.	I let my child make mud pies.						

Next Page 

INSTRUCTIONS: Please rate how strongly you agree or disagree with each of the following statements by placing a check mark in the appropriate box. Please use the following scale:

1=Strongly Disagree
2=Somewhat Disagree
3=Slightly Disagree
4=Slightly Agree
5=Somewhat Agree
6=Strongly Agree

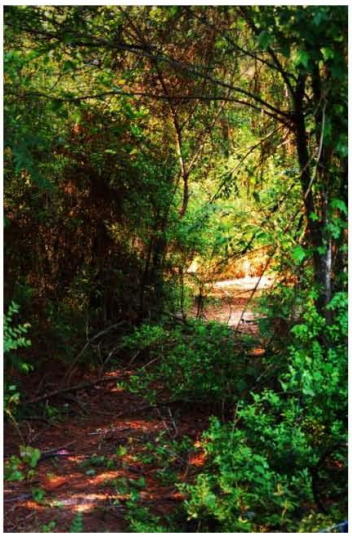
		1	2	3	4	5	6
38.	Taking part in outdoor recreation improves my child's communication skills.						
39.	Outdoor activities **over stimulate** my child.						
40.	Taking part in outdoor activities helps to build up my child's level of independence.						
41.	I would let my child play in a sand box.						
42.	Outdoor activities are a good way for my child to make friends.						
43.	Participating in outdoor play is a good way for my child to get exercise.						

Part III:

Pictures

INSTRUCTIONS: Please evaluate each picture shown with regards to the following statement: **I feel completely comfortable allowing my child to play in an area like this with appropriate supervision.** Please use the following scale:

1=Strongly Disagree
2=Somewhat Disagree
3=Slightly Disagree
4=Slightly Agree
5=Somewhat Agree
6=Strongly Agree

		1	2	3	4	5	6
44.							

Next Page

INSTRUCTIONS: Please evaluate each picture shown with regards to the following statement: **I feel completely comfortable allowing my child to play in an area like this with appropriate supervision.** Please use the following scale:

1=Strongly Disagree
2=Somewhat Disagree
3=Slightly Disagree
4=Slightly Agree
5=Somewhat Agree
6=Strongly Agree

		1	2	3	4	5	6
45.							
46.							

INSTRUCTIONS: Please evaluate each picture shown with regards to the following statement: **I feel completely comfortable allowing my child to play in an area like this with appropriate supervision.** Please use the following scale:

1=Strongly Disagree
2=Somewhat Disagree
3=Slightly Disagree
4=Slightly Agree
5=Somewhat Agree
6=Strongly Agree

		1	2	3	4	5	6
47.							
48.							

Next Page

INSTRUCTIONS: Please evaluate each picture shown with regards to the following statement: **I feel completely comfortable allowing my child to play in an area like this with appropriate supervision.** Please use the following scale:

1=Strongly Disagree
2=Somewhat Disagree
3=Slightly Disagree
4=Slightly Agree
5=Somewhat Agree
6=Strongly Agree

		1	2	3	4	5	6
47.							
48.							

Next Page

INSTRUCTIONS: Please evaluate each picture shown with regards to the following statement: **I feel completely comfortable allowing my child to play in an area like this with appropriate supervision.** Please use the following scale:

1=Strongly Disagree
2=Somewhat Disagree
3=Slightly Disagree
4=Slightly Agree
5=Somewhat Agree
6=Strongly Agree

		1	2	3	4	5	6
49.							

Part V: **Personal Characteristics**		
INSTRUCTIONS: The following questions are asked to compare children from different backgrounds to see if some children benefit from playing outdoors more than other children. Your responses to these questions, like all others, are completely confidential. Only the researchers will have access to this information. **Please circle the most accurate response.**		
49.	What is your gender?	
	Male	Female
50.	What is your child's gender?	
	Male	Female
51.	What is your child's age?	_____
52.	What is your ethnicity?	
	White	Native American
	African American	Hispanic
	Asian-Pacific Islander	None of the Above
53.	What is your current marital status?	
	Single, Never Married	Married/Partnered
	Separated	Divorced
	Widowed	

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Please circle the most accurate response.		
54.	Which of the following most accurately describes the area in which you reside?	
	Rural	Urban
	Suburban	Inner City
55.	How much time per day does your child spend **outdoors** in free play at home on average?	
	None	Less than 30 minutes
	30 minutes - 1 hour	1-2 hours
	2+ hours	
56.	How much time per day does your child spend **outdoors** in organized activities or sports on average?	
	None	Less than 30 minutes
	30 minutes - 1 hour	1-2 hours
	2+ hours	
57.	How much time per day does your child spend **indoors** in organized activities or sports?	
	None	< 30 minutes
	30 minutes - 1 hour	1-2 hours
	2+ hours	

58.	How much time per day does your child spend **indoors** on videos games or watching TV?	
	None	Less than 30 minutes
	30 minutes - 1 hour	1-2 hours
	2+ hours	
59.	How much time per day does your child spend **indoors** on free play, not including time spent playing video games or watching TV?	
	None	< 30 minutes
	30 minutes - 1 hour	1-2 hours
	2+ hours	
59.	What is your education level?	
	Less than high school (no degree)	High school graduate
	Some college	4 year college degree
	Graduate School	Other
60.	What is your yearly household income level?	
	Less than $14,999	$15,000-$29,999
	$30,000-$49,999	$50,000-$74,999
	$75,000-$99,999	$100,000 and above

THANK YOU!

VITA

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- Ph.D. 2011. Texas A&M University, College Station: Department of Horticultural Sciences. "Growing minds: The relationship between parents' attitudes about nature and the development of fine and gross motor skills in children."
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- B.A. 2001. Rice University, Houston, Texas: Psychology and Gender Studies.