Validity and Reliability of the Head Start Body Start Infant and Toddler Outdoor Play Space Assessment

Samantha Dolan

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Supervisory Committee:

Susan Sandall, Chair

Carol Davis

Elizabeth Sanders

Tracy Jirikowic

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Samantha Dolan

University of Washington

Abstract

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The quality of early care and education environments is associated with the learning and development gains of young children. Researchers are increasingly exploring the spaces that children access in childcare and preschool settings and have established reliable and valid tools for measuring quality of indoor early care and education environments and outdoor preschool environments. These tools are commonly used to assess environments and also serve as checklists for those designing a setting or looking to improve their care or preschool environments. Currently, no measurement tool designed specifically for infant and toddler outdoor spaces has been evaluated for reliability and validity. Head Start Body Start has created an infant and toddler outdoor play space assessment tool to evaluate the quality of outdoor environments for young children, and to serve as a checklist for care providers. In this study, the reliability and validity of this tool were assessed by analyzing content validity, construct validity, and internal consistency. An additional study differentiated between traditional play spaces and naturalized play spaces.

The content validity panel indicated that, with slight revisions, the tool was an appropriate measure of quality in infant and toddler outdoor play spaces. Further analysis

identified three underlying factors that emerged from the items in the areas of social and emotional development, motor and perceptual development, and approaches to learning. Domain scores for these three factors were compared between traditional play spaces and natural play spaces, revealing higher scores for the naturalized spaces. Additional revisions to the tool are suggested to increase reliability and validity. Implications for practice and directions for future research are discussed.

Dedication

For Tommy.

Acknowledgements

First I would like to acknowledge Dr. Susan Sandall, who has been so incredibly supportive and patient as I make my way through this process. I would also like to thank my reading committee members; Dr. Elizabeth Sanders, Dr. Carol Davis, and Dr. Tracy Jirikowski, for their time and flexibility.

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CHAPTER ONE

Introduction and Statement of Problem

Pre-kindergarten years, beginning at birth, are paramount to child development. Children develop critical physical, cognitive, social, emotional and academic skills in their first five years of life, and the quality of their surroundings is a key factor in their development (DeBord, 1996; Sajaniemi; Suhonen, Kontu, Ranten, Harri, Hyttinen & Hirvonen, 2014). The number of children enrolled in some form of early care and education and the substantial investment of public funds have generated a need for and growing body of research into the quality of these programs. Reviews of this research lead to the conclusion that the quality of the childcare environment plays a key role in the learning and development of young children (La Paro, 2014; Meyers, 2004; Moore, 1994, Sajaniemi et al.; 2014).

The number of children who participate in non-parental childcare, either in home- or center-based programs, in the United States is substantial. Publicly funded early care and education programs have grown rapidly in the last several decades, with $7.6 billion in federal funds (Fuentes, 2011). In the 2009 fiscal year, Head Start had 904,153 children enrolled in programs. Of these, 10% were infants and toddlers (Office of Head Start, 2010). In addition to public programs, private childcare and preschool programs enroll a significant number of young children. Increasing numbers of children participate in center-based early care and education programs, with 51% of 3-4 year olds in programs in 2012, up from 34% in 1990 (Annie E Casey Foundation, 2014). Within families with working mothers, 24.1% of children birth-4 are in center-based care (Federal Interagency Forum on Child and Family Statistics, 2015).

Quality of Environment

The relationship between indoor early care and education environments and child outcomes has been thoroughly examined. A quality environment can be associated with positive social, emotional and academic development as well as cognitive growth (Burchinal, Vandergrift, Pianta & Mashburn, 2010; DHHS, 2006; Pinto, Pessanha & Aguiar, 2013; Votruba-Drzal, Colay, Koury, Miller & Graesser, 2013; Sammons et. al, 2003). Conversely, environments lacking in markers of quality such as positive teacher interactions and a variety of independent learning centers provide children with a less rich experience, and do not have the same child outcomes as a higher quality center (Vandell, 2004; Moore, Sugiyama & O'Donnell, 2003). LaParo, Pianta and Stuhlman note that the idea of quality in an early learning environment has been examined in many ways and from many perspectives (2004). Some evaluations examine physical characteristics, however more recent studies tend to focus on interactions between teachers and children (LaParo et al, 2004; Moore, 2003).

The American Academy of Pediatrics states that childcare providers must ensure a high-quality environment for children that promotes safety, health and nurture children and note that every interaction with the environment forms a connection in a child's brain (AAP, 2012). A quality environment will invite positive interactions and stimulate learning and development in young children. The National Institute of Child Health and Human Development Study of Early Child Care (NICHD, 2006) further notes the importance of quality in child care settings, noting that higher-quality child care predicted better language and pre-academic skills in four year olds. Research on Early Head Start and Head Start programs suggest that the high quality Early Head Start and Head Start programs support positive child outcomes. Children and families who participated in Early Head Start programs exhibited more positive approaches to learning than

peers, as well as better social-emotional development (ACF, 2006). Children who went on to participate in formal Head Start programs after 3 years of age also had enhanced early-reading related skills (ACF, 2006). The same research project found that children in Early Head Start had significantly higher scores on an assessment of cognitive development and language development than did non-Early Head Start peers.

The importance of environmental quality implies that we must somehow define and measure what serves as quality in early care and education settings. Definitions of quality are based on research-driven best practices and measure of child outcomes. Measurement tools are developed and refined with the aim of quantifying levels of quality for program quality rating and improvement, accreditation, and research purposes.

There are a number of tools designed to evaluate indoor environments in early care and education settings (Burchinal et al., 2010). In the United States the Revised Early Childhood Environment Rating Scale (ECERS-R), Revised Infant and Toddler Environment Rating Scale (ITERS) and the Classroom Assessment Scoring System (CLASS) are commonly used and are described further in the next chapter (Clifford et al., 2010; Harms et al., 2009). A third edition of the ECERS has been published and is currently undergoing reliability and validity assessments (Harms et al.; 2014).

Several tools exist which can be used to measure the quality of outdoor environments. The Preschool Outdoor Environment Measurement Scale (POEMS) was designed as a checklist or evaluation tool for outdoor preschool environments (DeBord et al. 2004). The Outdoor Play Environment Categories tool (OPEC) examines physical parameters of outdoor space that are related to child activity and is used to assess spaces for children in the primary school years (Martensson et al., 2009). The Early Childhood Physical Environmental Rating Scale

(EC*P*ERS) was designed at the University of Sydney to address the physical spaces in early care and education centers, but has not been widely used (Sugiyama & Moore, 2005). The ECERS-R and ITERS-R, while focusing primarily on indoor aspects of early care and education environments, also include several items that address the outdoor environment. In the ECERS-R, one item indicates whether the size and accessibility of the outdoor space are sufficient for the program. Another item seeks to determine if the outdoor space and equipment is age appropriate and allows for physical activity. An additional item in the program structure subscale indicates if children spend a minimum of one hour outdoors, but does not evaluate the outdoor environment itself (Harms et al., 2005).

Child Development and outdoor and natural environments

The concept of quality in outdoor and natural environments in early care and education settings has not received the same level of investigation as indoor environments. Reviews of existing research support the idea that outdoor settings offer opportunities for learning and development that indoor environments may not (Moore, R. & Marcus, C., 2008). This invites questions on the relationship between the quality of the outdoor settings and child health and development outcomes. The results of a literature review on child development and outdoor environments are described in chapter two.

CHAPTER TWO

Reviews of Existing Rating Scales and Nature Based Learning

A number of rating scales are used to evaluate the quality of early care and education centers. Among the most frequently used are the Revised Early Childhood Environment Rating Scale (ECERS-R), the Infant and Toddler Environment Rating Scale (ITERS), and Classroom

Assessment Scoring System (CLASS). The ECERS-R and ITERS are used as markers of quality in 27 of the existing 38 State Quality Rating and Improvement Systems (QRIS) (Washington Department of Early Learning, 2014). A third edition of the ECERS has been published, and is currently undergoing reliability and validity checks (ESRI, 2015).The Preschool Outdoor Environment Measurement Scale (POEMS) measures the quality of outdoor environments for 3-5 year old children (DeBord et al., 2004).

The ECERS-R is a revised version of the Early Childhood Environment Rating Scale, first published in 1980. It contains 43 items, which are organized into the following 7 subscales: Space and Furnishings, Personal Care Routines, Language-Reasoning, Activities, Interaction, Program Structure, and finally, Parents and Staff. (Clifford, Reszka & Rossbach, 2012). The ECERS-R was developed as a way to evaluate process quality, or the experience of children within an environment, specifically in early care and education settings. The ECERS-3 has 35 items, organized into 6 subscales. The Parents and Staff subscale was removed from the third edition of the ECERS. Additional changes were made in the way items were structured after examination of the ECERS-R revealed that several indicators measured more than one domain of quality, but were only located in one domain, and information was lost (ESRI, 2015).

The ECERS is scored by a trained observer in an early care and education setting. The observer is to observe the class for a period of three hours, and spend approximately 30 minutes interviewing the caregiver. In addition to the items provided in the subscales, the observer records the date, time observation starts and ends, and the number of both staff and children present throughout the observation. The scoresheet includes areas to record the highest number of children allowed in the class, the number currently enrolled, and the highest number present

during the time of the observation. Additionally, the observer records the number of children with identified disabilities, and marks the type of disability (physical/sensory, cognitive/language, social/emotional or other). The observer also notes if there are any child food allergies or family food preferences.

Each item on the ECERS-R has statements that are grouped by inadequate, minimal, good or excellent. If the observer finds that the first statements, grouped as inadequate, are true, then the item is scored as a one. If the statement is not true, then the classroom is not inadequate in relation to that item, and the observer looks at the minimal statements. If these are all true, then a 3 is scored. If the statements are not true, the observer moves onto the next statements, under good, to see if they are true and the class room can be scored as a 5. If the statements for 5 are not true, the observer moves to the final group of statements, where 7 points can be earned for excellence. When some but not all statements are true, scores of 2, 4, and 6 can be earned.

In addition to staff and leadership use for center improvement and monitoring, the ECERS-R has been used in many research projects, including the Head Start Family and Child Experiences Study and the Preschool Curriculum Evaluation Research Program. The reliability and validity of the original ECERS has been established (Harms & Clifford 1980), and further study on the ECERS-R confirm that the revised version maintains reliability and validity as well (Harms, Clifford & Cryer, 1998; Sakai, Whitebook, Wishard & Howes , 2003). The ECERS-3 retains the basic properties of the ECERS-R, current efforts are focusing on establishing scorer reliability, assuming that concurrent and predictive validity will not be greatly altered by the third revision (ERSI, 2015). More specific details follow.

The authors of the ECERS-R conducted field tests of the ECERS-R to establish inter-rater reliability. They found a Pearson's r of .921, and Spearman rank order correlation of .865. The total score interclass correlation was .915 (Harms, et al, 1998).

Content validity was established for the ECERS, by selecting seven experts in childcare and early childhood to rate the importance of each item on the scale as it relates to early childhood (Harms et al. 1980). The reviewers rated 78% of all items as highly important, and the authors made alterations to the other 22% to increase validity. Content validity has not been reassessed following these changes, nor has the content validity of the ECERS-R been assessed. Other validity measures have been taken and are reported below.

Predictive validity of the ECERS-R, both in whole and specifically for the teaching and interactions factor, has been established for several early care and education domains including language and literacy (Burchinal, Howes, Pianta, Brying, Early& Clifford, 20; Love et al., 2004; Peisner-Feinberg et al., 2001), math concepts (Sammons, et al., 2003), cognitive development (Love, et al., 2004), and socio-emotional development (Burchinal, et al., 2008; Montes, Hightower, Brugger, & Moustafa, 2005).

One of the most extensive studies examined 240 sites serving preschool-aged children and which were receiving state funds (Burchinal, et al., 2008). A stratified random sample of 40 sites from each of six states (California, Georgia, Illinois, Kentucky, New York and Ohio) was used, and one classroom was randomly selected from each site. Within each classroom, data collectors selected four children meeting the following criteria: secured parental consent, were old enough for Kindergarten in the fall, did not have an Individualized Education Plan, and spoke English or Spanish well enough to understand simple instructions. 878 children

participated in the study initially, with 5% attrition due to relocation or parental withdraw for a total of 759 complete data sets. This study found significant, although not consistently strong, correlations between the Teaching and Interactions subset of the ECERS-R and performance in math measured on the Woodcock-Johnson-R math achievement problem subset (.09), as well as expressive language (.16) and receptive language (.16). Two measures of social skills were also related to ECERS Teaching and Interactions factor; Social Competence (.11) and Behavior problems (-.07).

The Revised Infant and Toddler Environment Rating Scale (ITERS-R) uses the same format and principles of the ECERS-R. The content differs, as it has been specifically designed to address the unique needs of infants and toddlers, from birth to 30 months (ERSI, 2015). The scale consists of 39 items, and is organized into the following 7 subscales: space and furnishings, personal care routines, listening and talking, activities, interaction, program structure, and parents and staff. The ITERS-R is scored in the same manner as the ECERS-R and ECERS-3. The space and furnishing subscale includes the presence of appropriate outdoor space and materials to support gross motor skill development outdoors. The program structure subscale asks if infants and toddlers spend a minimum of one hour outdoors, although this item does not address the quality of the outdoor area.

The ITERS went through reliability and validity analysis similar to the ECERS and ECERS-R. The revised version, the ITERS-R, retains the basic properties of the original tool and studies have focused primarily on observer reliability. One large study establishing reliability and internal consistency for the ITERS-R ITERS is reported below.

A study by the Environment Rating Scales Institute (2010) paired six researchers to administer the ITERS at 45 early care and education sites. The sites were selected to have varying levels of quality as rated by North Carolina's licensing standards. 15 sites had a low (1-2 star) rating, 15 had a moderate rating of three stars, and 15 were rated highly with 4 or 5 stars. In addition, the groups were selected to represent different age ranges. 15 included children under 12 months of age, 15 groups represented children 12-24 months of age, and 15 groups included children 18-30 months of age. Seven of the groups included children with disabilities. There were a total of 90 observations, with two paired observations in each of the 45 groups.

Authors found a high level of internal consistency overall (Cronbach's alpha= .93). Sub-scale internal consistency was at acceptable levels (above .6) for 5 of 7 subscales, with Space and Furnishings (.47) and Personal Care Routines (.56) below acceptable levels. The Space and Furnishing score should be noted as it measures the physical environment and is more similar to the OPSA than subscales measuring interactions.

Inter-rater agreement was established with agreement within one point of the seven point scale on 85% of items. Across the items, there are 467 indicators. There was agreement on 91.65% of all indicators. One item, Safety practices, had indicator agreement below 80% (79.11). Item reliability was measured with Cohen's Kappa and demonstrated acceptable levels. Concurrent and predictive validity were established in previous studies (ERS institute, 2010).

The Classroom Assessment Scoring System was developed as a framework for observing interactions within the classroom environment (Pianta, LaParo, & Hamre, 2008). There are versions of the tool available for six different age ranges, including infants, toddlers, pre-kindergarten, lower elementary, upper elementary and secondary grades. Each version is

organized into domains, which are further divided into dimensions. The domains and dimensions for each age group are summarized in Table 1 below.

Table 1

Summary of existing CLASS dimensions and domains

Age Group	Domains	Dimensions
Infant	Responsive caregiving	Relational Climate, Teacher Sensitivity, Facilitated Exploration, Early Language Support
Toddler	Emotional and Behavioral Support	Positive Climate, Negative Climate, Teacher Sensitivity, Regard for Child Perspectives, Behavior Guidance
	Engaged Support for Learning	Facilitation of Learning and Development, Language Modeling
Pre-K	Emotional Support	Positive Climate, Negative Climate, Teacher Sensitivity, Regard for Student Perspectives
	Classroom Organization	Behavior Management, Productivity, Instructional Learning Formats
	Instructional Support	Concept Development, Quality of Feedback, Language Modeling

The dimensions are assigned observable behavioral markers that can be scored. Trained observers rate each dimension using a seven point scale from low to high. Scores of 1-2 indicate low quality interactions. Scores of 3-5 indicate a combination of some high quality interactions and some low quality or missing interactions. Scores of 6-7 indicate consistently high quality interactions between children and teachers.

Psychometric studies on the CLASS have repeatedly established it as a reliable and valid measurement tool. A 2004 study included two hundred and twenty seven teachers from six states (LaParo, Pianta & Stuhlman). The study first established concurrent validity with the ECERS and Snapshot tools by comparing ratings on related scales and subscales (2004). The same study investigated the inter-rater reliability of the CLASS tool by comparing data collectors' observational ratings with the ratings of the tool's authors. To pass, the data collectors had to be within one point of the authors rating on 80% of the responses. The authors of this study also established internal consistency by performing a principal components analysis on the nine scales of the CLASS, and found that two factors, emotional support and instructional support accounted for 71.9% of the variance. The internal consistency of the scales that composed these factors had sufficient internal consistency of (alpha=.84 and alpha=.88), respectively.

The Preschool Outdoor Environment Measurement Scale (POEMS) was created as a tool to assess the quality of outdoor environments in preschool settings and a checklist for the design of outdoor environments. POEMS focuses on four domains of outdoor settings including both process and physical environment quality. The domains are interactions, play and learning settings, physical environment and caregiver/teacher role. Data was unavailable as to how widely used POEMS is, either as a checklist or for research purposes.

A study of 41 programs with 162 children was conducted to establish concurrent validity and internal consistency (DeBord et al., 2004). The internal consistency for the entire scale was acceptable (Cronbach's alpha =.87). Within domains, consistency varied. Interactions had an alpha score of .78; play and learning setting: alpha = .68; physical environment: alpha= .58; and caregiver/teacher role: alpha= .52. Concurrent validity was assessed by correlating total POEMS

scores with state licensing scores. A moderately strong correlation between the ratings and the poems score was found ($r = .43$, $p < .05$). POEMS does not address infant and toddler outdoor play spaces.

The Outdoor Play Environment Categories tool (OPEC) was developed to determine the play potential of an outdoor space. It is not age-specific. It has not been evaluated for reliability or validity, and data on the frequency of the use of this tool in any location is not available. The OPEC scores play spaces between 1 and three points in three different variables. Variable A is the total outdoor areas accessible to children. A score of 1 indicates it measures small (<2000m2), 2 indicates medium (2000–6000m2), and indicates 3 indicates a large space (46000m2). (Martenson et al 2006).Variable B measures the proportion of the area containing shrubbery, trees or hilly terrain. A score of 1 indicates that those elements are little or nonexistent. 2 indicates less than half of the areas is covered by those elements, and 3 indicates that greater than half of the environment is covered in shrubbery, trees or hilly terrain. Variable C is the degree of integration between vegetation, open areas, and play structures. A score of 1indicates that there is no integration, most vegetation is along edges and there is scanty vegetation adjacent to play structures. A score of 2 indicates that one of the following two characteristic are present (a) Play structures adjacent to trees and shrubbery or integrated into areas with the character of wild nature or (b) The open spaces are located in between play-areas and not in separate parts of the environment. A score of 3 indicates that the play space displays both a and b from above.

ECERS-R, ITERS-R, CLASS and POEMS, have all been shown to be reliable, valid and effective tools for measuring environmental quality in early learning settings. Very limited

data on the OPEC tool is available, and it is not commonly used in the United States. None of these, nor any other tools, are designed specifically to evaluate the quality of outdoor play spaces for infants and toddlers.

Infants and toddlers have vastly differing emerging abilities than preschool and school aged children. This is reflected in the creation of separate rating scales for infants and toddlers (ITERS), differentiated guidelines for age groups in state materials, and distinct age levels in the CLASS tool. The different social, emotional, cognitive and physical developmental processes occurring for infants and toddlers require different environmental supports to ensure safety and optimum opportunities for growth. For these reasons the POEMS tool is not appropriate for measuring quality of infant and toddler outdoor environments.

State licensing requirements address outdoor environments; however requirements vary greatly between states. The majority focus primarily on safety, while others incorporate opportunities for development. It is understood that the quality of an environment includes safety, but is not limited to it. The differences between states make it difficult to use the licensing requirements to compare quality of environment for infants and toddlers. A summary of various measurement scales used to measure quality environments in early care and education is found in table 2 below.

Table 2
Early Care and Education Environmental Quality Rating Scales

Tool	Primary use (indoor/outdoor)	Intended Age	What is measured	Year developed/revised	Reliability/ validity established

ECERS-R	Indoor	Preschool	Physical features and process quality	1980, 1998, 2014	Yes
ITERS-3	Indoor	Infant/toddler	Physical features and process quality	1990, 2005, 2015	Yes
CLASS	Indoor	Versions for infants, toddlers and pre-kindergarten	Process quality	2008, versions updated regularly	Yes
POEMS	Outdoor	Preschool	Physical environment and interactions	2004	Yes
OPEC	Outdoor	Birth-5	Play potential	2004	No

The Head Start Body Start Infant and Toddler Outdoor Play Space Assessment

The Head Start Body Start Outdoor Play Space Assessment (OPSA) was developed by an early childhood professional to provide a way of quantifying the quality of the physical outdoor spaces provided for infants and toddlers in early care and education settings. The development of the tool was at the request of Head Start, Body Start; a federally funded national organization with the goal of improving health outcomes for young children that has since been dismantled and absorbed by other organizations. The program had an existing rating scale for preschool outdoor play spaces, and wanted to develop an equivalent tool for infants and toddlers.

An early childhood professional with expertise in outdoor environments was contracted to create the OPSA using the Preschool Outdoor Play Space Assessment (POPSA) as a guide. The POPSA had 11 items, each measuring a different dimension of the physical environment.

Each domain was rated on a scale of 1-5, with 1 indicating that the dimension was not present at all, and 5 indicating that the dimension was fully present. The OPSA was designed to reflect the unique needs of infants and toddlers, and was structured in a different manner. While the OPSA measured dimensions of the play space with a 5-point scale, different dimensions were used. Several dimensions had specific criteria listed, and a few had more than one rating scale per dimension. The author of the OPSA referenced the Creative Curriculum for Infants, Toddlers and Twos, a commercially available curriculum package, when determining the dimensions. The author also referenced two books focusing on infants and toddlers; Outdoor Learning in the Early Years: Management and Innovation (Bilton, 2010) and Infants and Toddlers at Work (Lewin-Benham, (2010). During the development of the tool, the author sent drafts to a workgroup focusing on nature-based learning for young children. The group provided regular informal feedback as the tool was developed.

The OPSA has eight categories items representing dimensions of physical environments. In addition to health and safety, it measures the potential for infants and toddlers to develop physically and cognitively. Each item has a description of key features and several criteria. Users score each of the items between one and five, and are provided with space to make comments. The tool was designed with the goal of encouraging the creation, maintenance and intentional use of quality outdoor, and positioning outdoor environments as a space for learning and development in addition to play and recreation.

The eight categories are the following, with examples of criteria are found in Table 3 below:

Table 3

Categories and example criteria of the Outdoor Play Space Assessment

Category	Example criteria:
A. WELCOMING ENVIRONMENT: The overall environment is welcoming, inviting, and comfortable for infants, toddlers, and adults.	Several of the following are present: drinking fountain; diaper changing area; balance of shade and sun (trees, pergola, manufactured shade structures, open and sunny areas); sleeping/resting accommodations (mats, cots, portable cribs, quilts); places to sit, relax, rejuvenate (garden bench, porch swing, glider, outdoor chairs, vine teepee, small tent, pergola); division of spaces by activity (quiet/noisy, restful/active, wet/dry, messy/orderly); or other features that offer comfort.
B. KEY FEATURES: The overall play area has a variety of manufactured and natural materials that provide developmentally and age-appropriate opportunities for infants, toddlers, and twos to experience a sense of freedom, discovery, exploration, creativity, innovation, and sensory stimulation.	Creativity/Innovation: Several of the following are available: A variety of topographical surfaces; a variety of work surfaces; building blocks; tree cookies; loose parts for building; balls; writing/painting/drawing/sculpture materials; colorful scarves; or other materials to encourage creativity and innovation.
C. INTENTIONAL DESIGN: The overall play space reflects planning, management, and resourcing for curriculum implementation and ongoing child assessment on par with indoor play environments.	Resourcing: The outdoor space – including equipment, materials, natural and created features – has multiple, varied, defined, and multi-use learning and development areas.
D. NATURAL FEATURES: The overall play space allows and encourages children to connect with nature.	Several of the following are apparent: Planters; raised planting beds; bird feeder; bird house; trees for shade and climbing; umbrella; water (stream, bird bath, water hose, misters, sprinklers, water containers); flowering plants, edible fruits, vegetables; climbing vines; stumps; logs; boulders; tree cookies; long grass; pine cones; acorns, pebbles, and/or shells*; frogs; earthworms; bugs/insects; animals (as allowed by regulations); sand; twigs; dirt and mud; topographic variations (mounds, terraces, slopes); or other naturalized materials and features that connect children with nature.
E. MOVEMENT AND MOTOR DEVELOPMENT : The play space supports progress in children's locomotion and traveling skills, balancing and non-locomotor skills,	Balancing and Non-locomotor Skills: Infants: The play space provides opportunities for "tummy time", sitting propped up, sitting without support, rolling, stretching, rocking back and forth on hands and knees, and reaching. The

manipulative and object control skills, and fine motor strength and coordination skills.	play space includes several of the following: Quilts; mats; manipulatives; pull-up bar on grassy surface; walking/crawling path; or other features that support infants' emerging mobility and balancing skills.
F. FLEXIBILITY AND INDIVIDUALIZATION.	The play space supports both child-and teacher-initiated learning and development activities.
G. SAFETY, MAINTENANCE, SHADE AND STORAGE: The overall play space meets all relevant safety codes and regulations; receives planned, ongoing maintenance; and provides adequate and convenient storage.	Shade: 25% – 50% of the play space is shaded (by trees, tall shrubs, and/or man-made shade structures).
H. REASONABLE RISK AND CHALLENGE: The overall play space provides both risk and challenge appropriate to children's emerging skills.	The play space provides safe but stimulating features for children to self□assess their capabilities and skills (such as climbers, steps, topographical variations, garden tools, musical/acoustical feature).

State and organizational licensing requirements ensure the physical safety of young children. Tools like the ITERS evaluate indoor environments for infants and toddlers. OPEC and POEMS are appropriate to assess the quality of outdoor environments for preschoolers and primary school children. The OPSA will evaluate opportunities for children to learn and develop in the outdoor space. There is a need for a tool that addresses this specific population in an outdoor environment, so that infants and toddlers have access to equally enriching environments whether indoors or out. Examinations of research addressing outdoor environments finds that authors measuring quality of outdoor environments generally create their own tools.

The OPSA is a tool for evaluating infant and toddler outdoor environments, and if reliable and valid, will allow early care and education centers to determine if they are providing a safe, enriching and appropriate outdoor environment for the youngest children enrolled in their

program. Areas for improvement can be highlighted, and centers can strive to modify their play space to better meet the developmental needs of their children. Additionally, the tool can be used for research into relationships between quality of infants and toddlers outdoor environments and child outcomes. The OPSA is attached in its original form in Appendix A.

Objectives

The primary objective of this study is to determine the statistical reliability and validity of the Head Start Body Start Infant and Toddler Outdoor Assessment. Specifically, does the tool have acceptable levels of content validity, construct validity, and internal consistency to be an effective measure for early care and education centers? In answering these questions, this study will either support the use of the OPSA or identify areas for refinement.

Providing early care and education centers with a tool to reliably and validly measure the quality of outdoor environments for infants and toddler allows them to assess their strengths and weaknesses in providing areas for growth and development. Previously summarized research implies that access to quality outdoor environments can aid in physical, cognitive and motor skills development.

In addition, the ability to quantify aspects of physical environments provides researchers with a way to define high and low quality outdoor play spaces. This will allow for exploration into potential benefits of high quality outdoor environments for infants and toddlers. Measuring the quality of spaces and looking for relationships to child outcomes in health, social/emotional development, cognition and other areas can contribute greatly to the small existing literature base on infant and toddler experiences in outdoor and natural settings.

A secondary objective of this project is to determine if the OPSA is equally valid across environments with varying levels of naturalness. As noted previously, research suggests that young children who\interact with natural elements, such as trees and vegetation, rocks, and natural terrain may see a suite of benefits including increased motor skill development, ability to pay attention and greater levels of physical activity (Fjortoft, 2001; Faber-Taylor & Kuo, 2001; Bell, 2008). There is a growing movement to incorporate natural elements into children's play spaces, and a number of early care and education centers have begun transforming their outdoor environments from a traditional landscape of purchased play equipment and artificial surfaces into rich environments with varied topography, gardens and activity centers filled with natural elements (Cuppens et al., 2007). As the movement to add naturalness to early care and education settings grows, it is important to see if this outdoor assessment tool is equally appropriate to use in both traditional and naturalized outdoor environments.

Literature Review on natural environments in early childhood

A literature review found 20 studies exploring potential relationships between outdoor/natural settings and child outcomes. A search of the ERIC and PsychoInfo databases was conducted with the term outdoor paired with the words learning, academic, physical, social, emotional, and development. Returns were limited to peer-previewed articles and limited to birth-12, or infants-18 year olds. Although this study focuses on infant and toddler play spaces, limited research has been done on the relationship between outdoor environments and developmental outcomes for infants and toddler, so the inclusion criterion for age of participants was expanded to all childhood. A total of 834 original articles were found that met these criteria.

These articles were further examined for content and excluded if they did not report an outcome based study. Review articles and reports were removed. Also, studies were excluded if

they did not measure developmental outcomes of spending time in outdoor environments, but rather environmental education, outdoor education or another topic. Studies of environmental or outdoor education programs were included if they measured changes in student development outside of knowledge of environmental concepts or caring about the environment.

In the initial search the term environment was considered but rejected as it refers generally to any place learning occurs. It was assumed that the terms outdoor and natural would encompass natural and outdoor environments that are of concern in this review. In fact, the term nature was initially used in addition to outdoor, but upon testing returned a majority of articles about the nature of something rather that referring to the natural world. Finally, studies were excluded if they did not measure the impact of nature itself on the learning and development of participants. This was the case most often, as many studies report the impact of a specific curriculum and measured academic outcomes related specifically to environmental education curriculum. Studies such as these measured the efficacy of the curriculum in achieving learning goals, nit the impact the natural environment on student learning and development. These criteria produced fourteen studies.

In addition to the article search, existing databases, research summaries and lists created by experts in the field were examined for articles relating to Nature Based Learning and Development (Charles, 2007; Senaur, 2008; Senaur& Loge, 2012; Senaur & Loge 2009). When examined with the established exclusion criteria, these studies added five studies for further review.

Finally, an ancestral search was conducted by checking the reference lists of included articles to ensure that no studies were missed. This resulted in the addition of one study to bring the total number of studies included in this review to 20. Five broad content areas emerged from

the studies in the review. These are health, social/emotional, play, cognitive processes and academics. Articles in each are further explored in the following sections. Distribution of articles into the content areas can be found in table four. Note that several studies address multiple domains, and the total number of studies in the table exceeds 20, the number of studies in the review.

Table 4
Results of Literature review by content are and number of studies

Content Area	Number of studies
Health	11
Social/Emotional	5
Play	2
Cognitive	4
Academic	2

Health. The eleven articles related to health fell into the following subtopics: Motor Skills (1) Physical Activity(4), Body Mass Index (2), Asthma (1) and Vision (3).

Motor Skills. A 2001 study, Fjortof assessed the motor skills of 75 kindergarten students with the EUROFIT measure, a battery of nine physical fitness tests, at the beginning and the end of the school year. An experimental group played daily in a forest near the school for a period of 1-2 hours. The control group played for the same period of time on a traditional playground on school grounds. The post test showed that children with free play in the forest had significant improvements in eight of the nine measures of the EUROFIT test. Those in the control group showed significant improvement in three of the nine measures. Results suggest that natural elements provide opportunities to develop motor skills that traditional playgrounds do not.

Physical Activity. The growing obesity epidemic among children has the country looking for ways to keep children healthy. A 2010 report from the National Health and Nutrition Examination Survey presents disconcerting figures about the health of America's children, for example that approximately 17% (or 12.5 million) of children and adolescents aged 2—19 years are obese. Additionally, since 1980, obesity prevalence among children and adolescents has almost tripled (NHNES, 2010). Two common approaches to treating the obesity epidemic are nutrition and physical fitness. The number of studies addressing physical activity and children's weight as measured by the Body Mass Index may be in response to the growing numbers of overweight children and growing attention to the problem.

Four studies found a relationship between green or outdoor spaces and physical activity. Of these four, one looked at elements of a single playground (Dyment et al., 2009), two looked where children played in leisure time and the type of activity (Wheeler et al, 2010; Klesges et al.,1990), and in the final study children self-reported physical activity in two settings (Mygind, 2009).

Dyment used time scans to determine what areas of playgrounds were used by the greatest number of students, and rated the intensity of physical activity that occurred there (2009). Two playgrounds, one in Canada and one in Australia, were divided into six sections each, including play courts, manufactured equipment, green areas and fields. In both countries, green areas had the highest percentage of children engaged in moderate physical activity. While manufactured equipment had the highest percentage of children engaged in vigorous physical activity, green space encouraged physical activity at a higher level than the majority of areas on the playground and can be considered an important feature.

In a study of 222 preschoolers the setting and type of children's leisure activities were directly observed and coded by indoor/outdoor and rate of physical activity (Klesges, 1990). Playing outside was positively associated with high rates of physical activity. In a related but much larger study Wheeler et al. fitted 1307 elementary aged students with Global Positioning Systems and accelerometers to record physical after school activity and location for four days (2010). Locations were coded for level of greenness and activity was rated for intensity. Upon analysis it was found that children spent little outdoor time in green space, but the time that was spent in green spaces was more likely to be spent in moderate to vigorous physical activity. Taken together, these studies suggest that time spent outside, particularly in natural environments, promotes physical activity.

The fourth study addressing physical activity in relation to natural environments used self report of students to establish levels of physical activity in two environments. For three years, one class at an elementary school spent one school day per week in a forest (Mygind, 2009). Children completed questionnaires four times in both environments throughout the three years of the study. Students reported higher levels of physical activity in the forest environment than the traditional classroom. The small sample size (19) and method of data collection (student self-report) place limitations on interpretation of the study, however it does support the findings of the studies summarized above, that physical activity levels and frequency seem to be higher in outdoor, natural environments.

Body Mass Index. Two studies looked for a relationship between natural environments and Body Mass Index (BMI). Bell's study measured the greenness of several neighborhoods, and regularly measured the BMI of 3831 elementary aged children living in these areas over two

years (2008). BMI and neighborhood greenness were inversely related. Additionally, children in areas with high levels of greenness were less likely than others to increase their BMI over the period of the study, regardless of initial scores.

A second study used a questionnaire on child activity and health data to explore potential relationships between setting and health (Kimbro et al., 2011). One thousand eight hundred twenty-two responses were analyzed. Controlling for other factors, an inverse relationship between outdoor play and BMI was found. Additionally, television watching was positively associated with BMI, and the ratio of outdoor play to television watching was a significant predictor of BMI.

These studies, taken together, suggest that a relationship between BMI and the places children spend their time. The greenness of the spaces where children live as well as the amount of time spent in outdoor environments were associated negatively with BMI. In light of the physical activity outcomes reported above, these findings support the concept that outdoor, natural environments promote positive health status in children.

Asthma. A 2008 study from Lovasi, Quinn, Neckerman, Perzanowski and Rundle looked at associations between tree density in New York. Asthma prevalence in 4-5 year old children was gathered from public health data and organized by physical area. These areas were matched with data on tree density gathered by the New York tree census. Upon analysis, it was found that children in areas with higher tree density have lower prevalence of asthma.

Vision. Three studies focused on vision by administering eye examinations to students to determine presence of myopia, or nearsightedness. In two studies parent filled out a

questionnaire on child activity, health and family factors (Wu, 2010; Dirani, 2009) and the third administered a similar questionnaire to both parents and children (Rose, 2008). In all three studies, outdoor activities were significantly associated with lower levels of myopia. Wu and Rose found additional relationships of interest. In the Wu study, television watching was positively associated with myopia. An interesting interaction between television watching and time outside was found, where time outside had a protective effect against myopia when children watched television scarcely, but had no impact when television watching accounted for significant amounts of children's time. In Rose's study, higher levels of outdoor activity were associated with lower levels of myopia in twelve year olds, but no relationship was found in 6 year olds.

Social/Emotional. A total of five studies measured social and emotional outcomes associated with interactions with natural settings. They can be further divided into the subareas of inclusion (Davis Burnstein, 1986), friendship/interaction (Bar-Hairim & Bart, Han, 2008; Mygind, 2009), and stress (Wells & Evans, 2003).

Inclusion. A study of 18 preschool children (9 with disabilities, 9 without) in an inclusive classroom aimed to explore the relationship between peer interaction, activity and setting (Davis Burnstein, 1986). Interactions were observed during rug circle time, center time and outdoor time. Children with disabilities interacted with classmates without disabilities more when they were outside. This study is dated and should be interpreted with caution, but further research may confirm these findings.

Friendship/Interaction. A study of 88 kindergarten students playing in outdoor and indoor environments found that social interaction varies across settings (Bar-Harim et al.

2006). When children were outdoors, they had a significantly higher frequency of social and solitary-functional play than indoors. Indoor environments saw higher frequencies of social reticence and solitary-passive play. This study indicates that different environment may stimulate different play behaviors in children, and that outdoor environments may promote socialization.

A 2008 study from Han reported on the impact of natural elements added for one semester to a typical middle school classroom. In addition to other factors, feelings of friendliness were measured every two weeks before and after the plants were installed in the back of the classroom. It was found that the plants had an immediate impact on friendliness, raising scores significantly.

The Mygind study measuring impacts of school teaching class in the forest once weekly for three years reported a social impact in addition to the health impact reported above (2009). The majority of students established at least one new play relationship when in the forest, engaging in free play with a classmate that they did not play with in the school playground, suggesting that natural environment promote different kinds of play and collaboration than traditional school environments.

Stress. A final study rated the naturalness of children's home surroundings as well as parent and child reports of children's self-worth, psychological distress, and stressful life events (Wells, 2003). When analyzed, data suggests that the impact of life stress is lower in children with high levels of nearby nature than those with little nearby nature, suggesting that nature may help children cope with life stress.

When considered as a group, it seems that natural elements and outdoor settings promote different relationships and interactions than environments without natural elements. In addition, emotional well being and reactions to adverse events may be related to features of outdoor settings near the home.

Play. Two studies looked at aspects of play as they relate to outdoor settings. The first looked at aspects of risky play (Sandsetter, 2009), and the second focused on types of play that occur (Taylor et al. 1997).

Risk. In the first, Sandsetter observed twenty preschool children in both a traditional and a natural playground over a period of seven days (2009). Risk behaviors were recorded, and playgrounds were assessed for the degree of potential risk. It was found that the natural playground had more opportunities for risky play as well as opportunities for a higher degree of risk. Children on the natural playground engaged in risks of a higher degree but did not engage in risky activities at a higher frequency than on the traditional playground. The authors argue that risk is considered as essential to growth and development, and natural elements on a playground encourage risks that are reasonable rather than hazardous.

Type of Play. The second study examined the types of play that occurred in the courtyards of a public housing development (Taylor et al., 1997). The courtyards were coded as high or low vegetation based on the amount of natural growth that was present. The frequency and type of play that occurred was recorded in addition to children's access to adults. Overall, 262 children were observed playing during the duration of the study. More play overall took place in courtyards with high vegetation. The type of play was different as well, with more

creative play in high vegetation areas. It was also found that children had greater access to adults in these areas.

Cognitive. Environmental psychology has documented the relationship between natural settings and cognitive functions in adults, and these studies support the idea that the same relationship may exist in children (Tennesen & Cimpritch, 1995). Four studies measure attention and impulsivity following exposure to outdoor and/or natural environments.

The relationship between cognitive processes and the naturalness of environments has been explored in elementary school children in two studies by Taylor and Kuo (2002, 1998). In the first, the parents of 96 children with attention deficit/hyperactivity disorder (AD/HD) completed surveys rating the severity of their children's AD/HD symptoms after a variety of activities. The activities were coded as occurring indoors, in built outdoor environment or in green, outdoor environments. Parents reported a reduced presence of symptoms after children were in green, outdoor environments. Activities in non-green settings exacerbated symptoms. In general, symptoms were lower in children who played often in green setting.

In the second study the authors rated the naturalness of the view from elementary-aged children's homes and administered tests of concentration and impulse inhibition (Taylor & Kuo 1998). The results in this study differed by gender. For girls, view was significantly associated with impulsivity and attention. For boys there was no relationship found. Authors suggest that perhaps this results from children playing further away from their own homes than girls.

In a study measuring eye-gaze, 27 preschool children were better able to maintain attention immediately following sustained outdoor time than similar activities indoors (Holmes,

Pelligrini & Schmidt, 2006). In a study of preschool children in various outdoor play spaces, children playing in a natural setting had fewer instances of inattention post-recess than their classmates in a more traditional playground (Martensson et al., 2009).

Academic. Two studies reported relationships between outdoor environments and academic performance. The first, a 2011 study of elementary and middle school classes, qualitatively examined student and teacher reactions to an exploratory program that used school grounds to teach math concepts to students (Moffett). Observations and interviews with teachers and students revealed that using natural setting to provide authentic math experiences was beneficial to student learning. Teachers felt that the change of setting increased motivation to learn math. Children felt that they learned a lot from the experience. This exploratory study has many limitations, but does suggest that more rigorous research into the efficacy of using natural settings to teach academic subjects may reveal positive outcomes.

The second study by Mygind was described in the health and social/emotional sections above (2009). In addition to the result discussed previously, students reported less sloppiness in their school work when classes were held in the forest. This may be related to the cognitive benefits of natural settings, or may have a different underlying mechanism. While neither of these studies provide concrete evidence that academic performance is improved by natural settings, the results encourage future research.

Exposure to Natural Elements

Given the variation of setting that these studies were set, it is worthwhile to look at the location of the natural elements the children were interacting with. Some studies examined the

proximity of children's homes to green spaces, and the degree to which their neighborhoods were "green." Benefits associated with naturalized setting near home include improved coping with stress, improved attention, more creative play, lower prevalence of asthma, lower body mass index and greater physical activity (Taylor & Kuo, 1998; Kimbro et al., 2011; Lovasi et. al, 2008; Wells, 2004)

Another approach that was taken was nature on the school ground, either in the classroom itself or the outside. Because children spend a significant portion of their day at preschool, school or childcare, these studies have implication for the design of such areas (Frasier et al., 2010; Clements, 2004). In general, these studies reported that going outside during the school day can produce benefits in social interactions, academics, and play (Bar-Harim 2006; Davis-Burnstein 1986, Moffet, 2011; Sandsetter, 2009).

A third approach looked at the benefits of going outside in general with no measure of the naturalness of setting. These studies found that lower risk of nearsightedness, lower BMI, greater physical activity were related to outdoor settings regardless of the amount of greenness (Wu, 2010; Dirani, 2009; Kimbro, 2010; Mygind 2009; Rose, 2008). Research specifically on infants and toddlers in natural and outdoor settings is limited, however what exists seems to suggest that very young children benefit from outdoor and natural environments as well. Infants who took naps outside, a common practice in several Scandinavian countries, slept up to three times longer than when they napped inside (Tourula et al., 2010). Additionally, studies suggest that high activity levels in toddlers are associated with lower body mass index scores later in childhood, which is an indication of healthy weight (Gunner et al., 2005; Moore et al., 2003). These high activity levels can be achieved frequently in outdoor environments (Klesges et al., 1990).

Additionally, vitamin-D deficiencies, which are a growing concern for infants and toddlers, can be addressed through exposure to natural light (Huh, 2008; Kimball, Fuliehan & Vieth, 2008).

Taken together, the results of this literature review indicate that the outdoor environment in early care and education settings may contribute to developmental outcomes for infants and toddlers. This supports that there is a need for a reliable and valid measurement tool to assess the quality of the outdoor environments that young children have access to.

Purpose of the Present Study

This study aims to examine the reliability and validity of the Head Start Body Start Infant and Toddler Outdoor Play Space Assessment. Environmental quality in early care and education settings may shape the learning and development of the children enrolled in the programs (DeBord, 1996; Meyers, 2004; Moore, 1994). At present, the existing reliable and valid measurement tools for establishing the quality of an early care and education setting do not address the outdoor play space. Quality outdoor spaces and interactions can provide unique opportunities for learning and development. A reliable and valid tool to measure the quality of infant and toddler outdoor play spaces has the potential to improve learning and development outcomes for young children.

Research Questions

Based on the need for further information on the OPSA, the following research questions were asked:

1. Does the Head Start Body Start Infant and Toddler Outdoor Play Space Assessment have content validity in that it represents the domain of overall quality and opportunities for growth and development for infants and toddlers in an outdoor environment?

2. Does the OPSA have internal consistency and construct validity to support its use as a valid measurement tool of environmental quality in outdoor infant and toddler play spaces?

3. How do naturalized play spaces differ in their domain scores from non-naturalized play spaces on the OPSA?

In order to answer these questions, the reliability and validity of the OPSA was evaluated through an iterative test development process. Three studies were designed to examine aspects of the tool. Study one used a content validity panel to determine content validity of the tool. Study two analyzed data collected at 120 early care and education centers. Construct validity was measured by an exploratory factor analysis. Construct validity was measured through a principal components analysis. Internal consistency was evaluated by calculating Cronbach's alpha. Study three differentiates between traditional play spaces and naturalized play spaces, and compared measures of reliability and validity of each group.

CHAPTER THREE

Study One

Methods.

In this study the steps outlined by Crocker and Algina were used to establish content validity: a) defining the performance domain, in this case quality of outdoor play spaces for infants and toddlers, b) selecting a panel of qualified experts in this domain; c) providing a structure to allow matching of items to the domain; and d) collecting and summarizing data (1986). More detail on each of these steps is found in the sections below.

Participants. The content validity panel included 5 experts representing fields related to infant/toddler outdoor play space assessment. Few early childhood professionals have specific expertise on outdoor environments for infants and toddlers, so the author ensured that the panel incorporated representatives from three related disciplines: infant and toddler development, environmental rating scales and play space development. Potential participants were identified by searching for the authors of books or articles on infant/toddler development, authors of studies examining play spaces, faculty in landscape architecture and early childhood programs, early childhood licensing authorities, and the authors or environmental rating scales. Potential participants were contacted over email and phone initially. Participation was not incentivized. 12 experts were identified, and 5 elected to participate. The expertise of the participants is found in the table below:

Table 5

Content Validity Panelist Overview

Participant number	Areas of expertise	Qualifications
1	Child development, environmental assessment	Teaches a course in early childhood environments, coaches program staff to meet state standards
2	Environmental rating scale development,	Co-authored environmental rating scale

3	Play space development, environmental assessment	Develops play spaces for young children, provides professional development on play space design
4	Early care and education, child development	Infant and toddler classroom teacher, instructor in early childhood undergraduate program
5	Landscape architecture, play space development	Teaches courses at graduate level on play space design

n= 5

Procedure. The panel was given a copy of the OPSA, a written summary of the domain of interest and a recording sheet which allowed them to rate items on the scale. The domain of interest is defined as the overall quality of infant and toddler outdoor spaces in early care and education environments (Appendix D). Experts were asked to label each item on the OPSA as essential, useful but not essential, or not necessary to determine the quality of an infant and toddler outdoor play space. An additional row on the form allowed relevant comments as needed.

Participants on the panel were asked to reply within a two week time period. All participants responded within 10 days. Within two weeks of the initial response to the form, a follow up in-person or telephone contact was attempted to clarify comments made and assess overall impressions of the tool. Three of the participants responded to the contact and confirmed their comments. The other two declined to follow up.

Analysis. Content validity was analyzed following the model of Lawshe (1975). A content validity ratio for each item was created using Lawshe's formula CVR = (ne-(N/2)/(N/2) where ne= number of panelists indicating 'essential'. N = total number of panelists. Positive values indicate that at least half of the panelists rated the item as essential to the construct. Items

earning positive values are considered valid and items receiving negative ratings, or deemed non-essential by more than half of the panelists, were removed from the tool.

Results. Content validity was analyzed following the model of Lawshe (1975). A content validity ratio for each item was created using Lawshe's formula CVR = (ne-(N/2)/(N/2) where ne= number of panelists indicating 'essential'. N = total number of panelists. Positive values indicate that at least half of the panelists rated the item as essential to the construct. Items earning positive values are considered valid and items receiving negative ratings, or deemed non-essential by more than half of the panelists, were removed from the tool. The results of the content validity panel are presented in the table below.

Table 6

Content Validity results by item

Item number	Description	Content validity ratio	Determination
A1	Welcoming and inviting environment	-.2	Invalid, removed from tool
A2	Comfort and routines	.6	Valid
B1	Sense of freedom	1	Valid
B2	Discovery and exploration	.6	Valid
B3	Creativity and innovation	1	Valid
B4	Sensory stimulation	1	Valid
C1	Planning for core areas of child development framework	1	Valid
C2	Management of space	.6	Valid
C3	Resourcing	.2	Valid
D1	Natural features	.2	Valid
E1	Locomotion and traveling	1	Valid
E2	Non-locomotor skills	1	Valid

E3	Manipulative/object control	1	Valid
E4	Fine motor, strength and coordination	1	Valid
F1	Adaptability and flexibility	1	Valid
F2	Change over time	-.2	Invalid, removed form tool
F3	Supports child and teacher initiated activities	.2	Valid
F4	Supports solitary, parallel and cooperative play	.6	Valid
G1	Safety codes and regulations	1	Valid
G2	Shade	1	Valid
G3	Maintenance	1	Valid
G4	Storage	.6	Valid
H4	Reasonable risk and challenge	.6	Valid

n=23

Reviewers suggested several additional refinements to the tool in their comments. All reviewers noted that the 5 point rating scales are not consistently applied to the criteria. For example, category A has two criteria and one rating scale, category B has four criteria and one rating scale, and category C has three criteria and two rating scales. This is problematic because it is unclear how to provide scores for items with multiple criteria represented by one scale. It was suggested that each criteria receive an individual rating scale. In response to these comments the principal investigator added rating scales to each criteria.

Two reviewers also commented that the rating scale scores for 2-Somewhat and 3-Partially, were difficult to discriminate. It was unclear to them when each number would be used. The principal investigator replaced the term “Somewhat” with the term “Minimally” to more

clearly indicate that a score of two is appropriate for play spaces that meet one or more criteria in a limited way or have one of the examples present. It also provides a counterpoint for the option of "Mostly," which is used for spaces that have met most of a criteria or have the majority of the examples present.

Additional comments were made related to specific criteria. Reviewers noted repeated elements among the criteria, both within and across categories. For example, in Category B (Key Features) exploration is an independent criteria listed in item 2, and is included in item 4. Similarly, opportunities for different categories of play is listed in Category C (Intentional Design) criteria 1: planning. Social and Emotional development sub criteria b is also listed as an independent criteria in Category F (Flexibility and Individualization) Criteria 4. These repeated elements are problematic because the same measures are being used within the tool to indicate multiple elements of quality.

Additional inconsistencies in wording were identified by the reviewers, including "examples of each of the following are included" in the Language and Literacy sub criteria for criteria 1 (Planning), Category c (Intentional Design). This wording indicates that the play space must contain the entire list of elements to score a 5, when in the reviewers opinion having several of the elements would suffice. This was unique to this particular sub-criteria. The wording was changed to "several of the following," to provide consistency between categories.

It was also noted that criteria 3 and 4 in Category F (flexibility and individualization) are far less detailed than other criteria and do not provide examples. In the follow up interviews, panel participants were asked for examples that demonstrate the criteria. These were evaluated by the principal investigator and added to the tool.

Category H, Reasonable Risk and Challenge, was determined by the panel to be valid. Four of the five reviewers noted that the criteria contain items that are found elsewhere in the tool. Criteria 4 was determined to be the only criteria not repeated elsewhere in the study, and was retained. Because only one of the four criteria were retained, additional rating scales were not needed in category H.

Overall, significant changes were made to the wording of the rating scale, the application of the scale to items and the language of the sub-criteria of the categories. The revised OPSA used for data collection is found in Appendix B.

CHAPTER FOUR: STUDY TWO

Methods

Study two evaluates inter-rater reliability and subsequently explores construct validity and internal consistency.

Inter Rater Reliability. Following the alterations to the tool described above, two observers were used to assess play spaces with the OPSA. Study two first measured inter-rater reliability between the data collectors. Inter-rater reliability is necessary to ensure that there are no differences in the way data collectors use the tool and apply the rating scales. The observers include the principal investigator and an early childhood educator with a Master's Degree in Education. Data collectors received thorough training on the use of the OPSA before taking part in the study over the course of one day. The training was designed by the creator of the tool, and modified to reflect the changes made. Training was administered by the principal investigator, who has received instruction in administering the training and overall use of the tool. During the

training process, each item on the OPSA was described in detail, and visual aides were used to provide concrete examples of the types of things referenced by the tool. The observer was told how to select a score on the rating scale using the criteria, and the principal investigator modeled scoring a play space while describing her reasons for the scores she assigned.

Procedure and Analysis. Immediately following training on the tool, inter-rater reliability of the observers was established. The observer and principal investigator viewed photos of 10 infant and toddler outdoor environments and scored them using the revised version of the OPSA. Inter-rater reliability was calculated by evaluating the percentage of item scores in which the observers scored within one point of each other. The initial scoring of the environments yielded agreement within one point on 83% of items. This score is within the acceptable threshold for inter-rater reliability (>.80), however the PI and observer elected to examine the items which they scored differently and discuss the scoring. A second set of 10 photos of outdoor play spaces was scored, and inter-rater reliability was established at 89%.

Participants Sites for the second study were randomly selected from a comprehensive list of early care and education centers in the Northwest service area of Washington State as defined by the Washington State Department of Early Learning. This area includes the cities of Bellevue, Bellingham, Bothell, Burien, Camano Island, Carnation, Clinton, Des Moines, Duvall, Everett, Issaquah, Kenmore, Kirkland, Lake Forest Park, Langley, New Castle, Normandy Park, North Bend, Mercer Island, Oak Harbor, Seattle, Redmond, Renton, Sammamish, Seatac, Shoreline, Snoqualmie, Tukwila, Vashon, Woodinville. The list was accessed through the Department of Early Learning in January of 2014.

Sites were included if they provide early care and education to infants and toddlers and are a licensed, center-based program. 308 sites meeting these criteria were placed on a list and assigned a number. A total of 200 sites meeting the needs of the study were randomly selected. These randomly selected sites were contacted via phone to secure permission and access to the site. As an incentive for participation, sites who opted to participate in the study were entered in a drawing for a $50 gift card to Amazon.com for use in purchasing items to improve their infant and toddler play space. The script for contacting the sites is attached in Appendix E.

Initially, 89 of the 200 sites agreed to the study on first contact. Messages were left for 108, and 3 were unavailable through the phone number listed in the database provided by the state. Emails were sent to the three sites that were unavailable by phone, and one responded but declined to participate. 49 of the 108 sites that had been left messages returned the phone call within two days, and of these 21 agreed to participate. Follow up calls were made to the remaining 59 sites, and participation was secured from 36. Overall 146 sites agreed to participate in the study. Due to limitations in time and funding, 120 of these sites were randomly selected for assessment.

Publically available information on the sites was collected to determine if there are significant differences between those willing to participate, and non-responders/those who declined to participate. Sites were checked for participation in the state's voluntary Quality Rating and Improvement System (QRIS), Early Achievers. 56 of the 146, or 38.4% of the sites that agreed to participate in the QRIS. 20 of the 54, or 37.0% of sites that chose not to participate in the study participate in the QRIS. This is comparable with the 40.3% for participation in King county (DEL dashboard, 2014).

Participant locations were from a total of 14 cities. Almost one third are located in Seattle, with the next highest concentration in Bellevue. This is unsurprising given the population density of these cities. The number of sites by location is reported in table 7 below.

Table 7
Participant locations by city

City	Number of participants
Bellevue	20
Bothell	3
Duvall	2
Issaquah	9
Kenmore	2
Kirkland	8
Mercer Island	1
Redmond	10
Snoqualmie	1
Woodinville	2
Sammamish	2
Seattle	39
Shoreline	2
Lake Forest Park	1
n=120	

Of the participating locations, 2 provided free services and support to children and families through Washington State's Early Childhood Education and Assistance Program for low income families. Three were Head Start or Early Head Start Grantees; receiving federal funding to provide services for young children and families with limited income.

The capacity of the programs varied from 15 to 274 children, with a mean of 76.58 children. It is unknown if all programs were operating at capacity at the time of data collection.

Data collection. Data collectors traveled to the sites at a previously arranged time when children were not present in the play space. Data collection took place over a period of four

weeks during the spring season. Weather is cited as a barrier to using outdoor play spaces, and to support accurate rating visits were planned at a season when weather is less likely to keep the space from use.

Observers walked through the play space, and spent up to 30 minutes at each site completing a copy of the OPSA. Upon completion, the OPSA forms were returned for entry into the study database.

Internal consistency. Internal consistency refers to the ability of the items on the rating scale to measure a single concept (Bailey, 2004). Scores from the OPSA were entered into a statistical analysis software program (SPSS) and a principal components analysis was run to identify underlying constructs and the items that compose them. When all sites were observed and all data collected and entered, total-scale internal consistency was measured by determining Cronbach's α.

Construct Validity. A principal components analysis and exploratory factor analysis were conducted on the data to attempt establishment of underlying constructs in the rating scale items. The results of the analysis were interpreted with the content validity to explore construct validity.

Principal Components Analysis

A principal components analysis indicated a lack of reliable factors to retain for an exploratory factor analysis. There was no indication of problematic variables in the communalities, since all were >.40. Inspection of eigenvalues showed 10 components account for 67.4% of total variance, however none accounted for greater than 11% individually. The

scree plot indicated that four factors can be examined. Taken together, this indicated that an EFA with 3 components may yield the closest fit for the data, however these factors were not reliable. These three factors were selected to reflect three domains of child development: physical, affective and cognitive.

Exploratory Factor Analysis

A three-factor exploratory factor analysis with maximum likelihood estimation and Varimax orthogonal rotation was completed on the 24 items of the OPSA to identify intercorrelations among the items. Maximum likelihood estimation was selected to maximize the probability that the observed item correlations are samples from model-implied parameters. Rotation algorithms were used to aid in interpretation of results by preserving relationships while shifting axes in space so that relationships are closer to axes. This initial analysis revealed 10 factors with eigenvalues greater than one. Six items were found with lower than acceptable communalities and were removed from the analysis.

A second EFA was run on these 18 items, and found 5 factors. Two of these factors were comprised of single items and were removed. Two additional items did not load significantly on any factors, and were also removed from the analysis. This left three factors and 14 items for the third EFA. This analysis found three factors that fit the data, comprised of 7 total items. The loadings on the second and third factor are weak, but acceptable.

These three factors represent distinct underlying characteristics that affect item response patterns, and are reported in the table below.

Table 8

Exploratory Factor Analysis with Varimax Rotation

Item	Description	Communalities	Factor 1 Loading	Factor 2 Loading	Factor 3 Loading
F4	Flexibility/individualization	.737	**0.84**	-.137	-.145
C7	Intentional Design	.829	**0.88**	.050	-.029
B2	Discovery	.332	-.085	**0.45**	.144
C1	Physical Development and Health	.358	-.219	**0.49**	-.155
A2	Comfort and Routine	.296	.155	**0.57**	.028
F1	Adaptations	.235	-.059	.199	**0.45**
D1	Natural Features	.393	.180	-.105	**0.54**

n=120

Taken together, the three factors account for 45.4% of variance. Factor one accounts for 23.0%, factor two accounts for 12.6% and factor 3 accounts for an additional 8.85%. This leaves 54.6% of variance among items unaccounted for by these three factors, and is not ideal.

The factors appear to represent three of the five core domains of the Head Start Early Learning Outcomes Framework (2015). Factor one includes various materials and features that can be used for initiating and engaging in play with others. Item C7 lists various materials that were intended to measure opportunities for science and social studies development, including miniature roads, buildings and people. These materials support the development of relationships with adults and children as well as the exploration of emotions. Item F4 measures if the environment allows for solitary, parallel and cooperative play. It does not list specific items or features that meet this criteria, however examples were given to the data collectors during training. Both of these items represent the Social and Emotional domain of the framework, and so this factor is named Social and Emotional Development.

Factor two includes item C1, which measures features relating to physical development and health; item B1 which includes many features allowing for physical exploration, and item A2 which measures potential for comfort and support for routines. Each of these items lists features that align with the Perceptual, Motor and Physical Development domain of the framework. For example, the presence of a handwashing station outside supports the development of healthy behaviors in toddlers. This factor is named Perceptual, Motor and Physical Development.

The third and final factor includes items D1 and F1. On the OPSA, D1 was the only item in the Natural Features subscale, and F1 was in the flexibility and individualization subscale. Both items contain elements that relate to the domain Approaches to Learning on the Framework. For example, the potential novelty of natural elements such as gardening tools or birdfeeders can encourage infants to approach new materials with interest and creativity as they examine them. The third factor is named Approaches to Learning.

Internal Consistency

Internal consistency was computed by completing a reliability analysis on SPSS 19. Cronbach's alpha was calculated for all items and each factor. A value for α between 0.70 and 0.90 is generally considered acceptable. A value below 0.70 will suggest that the items on the OPSA do not measure one underlying construct. A value greater than 0.90 is considered high, and suggests possible redundancies.

Cronbach's alpha for all variables was .538. Values were .86 for Social and Emotional Development, .53 for Perceptual, Motor and Physical Development, and .39 for Approaches to

Learning. This suggests that the items in Social and Emotional Development are closely related. Scores for the other two actors are lower than commonly accepted, but this may be due to the small number of items in each factor.

CHAPTER FIVE: STUDY THREE

Methods. The third and final study looked specifically at a set of early care and education sites that have naturalized their outdoor environments.

There are varying degrees to which a setting can be natural, and various ways to measure this. Some studies look at the amount of vegetation in an area and rate it as high or low (Taylor & Kuo, 1998; Wells, 2003). Other times the amount of natural elements and manmade elements are compared and an environment may be labeled indoor, outdoor built or outdoor green (Taylor & Kuo, 2001; Tennesen & Cimprich, 1995, Wells, 2003,). Still others may just distinguish between indoor and outdoor areas, without noting natural elements that may be present (Veitch et al., 2006).

A naturalized play space is defined, for the purpose of this study, as one that incorporates natural elements including plants (including both in gardens and out), dirt, wood structures, water features, trees and rocks in a way that children are able to interact with them. A naturalized play space will use these elements in place of large plastic and metal structures and artificial surfaces when appropriate and safe. The specific criteria to determine if a play space is naturalized were formed from a review of existing work on naturalized and naturalizing a play space, and are found in Appendix B. These criteria were applied to the play spaces when observers arrived to complete the OPSA.

None of the 120 sites reviewed met these criteria, however 15 received the maximum score on the OPSA item measuring naturalness of the play space, item D. These 15 were compared to the others with a series of two-group t-tests comparing composite scores for the three identified factors between the play spaces scoring 5 on the OPSA and the others. Levene's test was used to determine if variances could be assumed equal.

The 15 sites that received the maximum score on item D were not geographically representative of the whole sample (Table 9). A higher percentage of highly natural sites from Bellevue, Bothell, and Mercer Island scored a 5 on item D, and a lower percentage of sites from Seattle.

Table 9
Site locations by percentage of sample for highly natural and traditional play spaces

City	Percentage of traditional play spaces located in the city *n*=15	Percentage of highly natural play spaces located in the city *n*=120
Bellevue	53.3	16
Bothell	6.6	2.5
Issaquah	7.5	7.5
Mercer Island	6.6	0.8
Seattle	26.7	32.5

n=120

Results. The t-tests for the composite scores of the factors social and emotional development and perceptual, motor and physical development had less than critical p values, which indicates that naturalized sites score differently on the OPSA than traditional spaces. The third factor, approaches to learning differed significantly.

Table 10
2-group t-test comparing factors by level of naturalness in play spaces

Measures	Low/medium $n = 120$		High 4.00				
	M	*(SD)*	*M*	*(SD)*	*t*(117)	*p*	*d*
Social and Emotional	3.47	(0.66)	4.00	(0.66)	*-1.395*	*0.113*	*-.44*
Perceptual, Motor and Physical	3.22	(0.49)	3.06	(0.68)	*.865*	*0.400*	*.28*
Approaches to Learning	3.78	(0.48)	4.63	(0.35)	*-6.640*	*0.000*	* *-2.03*
n=120							

* $p < .05$ when adjusted for multiple comparisons using Bonferroni (controlling familywise by construct).

CHAPTER SIX: DISCUSSION

These studies were conducted in an attempt to learn more about the reliability and validity of the Head Start Body Start Outdoor Play Space Assessment for infants and toddlers, and to determine if it is a reliable and valid measurement of the quality of outdoor spaces in early care and education settings. The results of the study indicate that the current version of the OPSA has problematic items which prevent it from being a valid measurement tool, but suggest that continued restructuring and rewording of the items may prove to increase the reliability and validity of the tool.

Summary and interpretation of findings

Content Validity

The content validity panel identified several problems with the original OPSA, including repeated elements and several items which were not essential to the quality of the play space as defined for this study. The panel also related that the rating scales used were not aligned with the number of items on the scale. Overall two items were removed from the tool, and an additional

12 scales were added with the intent of increasing the validity of the tool in measuring dimensions of quality.

Construct Validity

A principal components analysis was used to determine how many factors to retain for an exploratory factor analysis. The PCA did not indicate high reliability, but suggested that three factors may be the best model for this data. Repeated exploratory factor analyses identified three factors that best fit the data. A total of 7 items loaded significantly onto the factors.

In the initial EFA, six items were found to have lower than acceptable communalities, indicating that the variation in site scores on these items was not accounted for by the 10 factors in the initial EFA. This may be due to the wording of the items. The six items and potential wording issues are found in the table below:

Table 11
Items with low communalities and possible explanations

Factor	Problematic wording
B3 Creativity/Innovation: Several of the following are available: A variety of topographical surfaces; a variety of work surfaces; building blocks; tree cookies; loose parts for building; balls; writing/painting/drawing/sculpture materials; colorful scarves; or other materials to encourage creativity and innovation.	This item asks for example of multiple environmental components, and also includes the term "or." This is problematic as it leaves room for variation in the way the space is rated.
B4 Sensory Stimulation (touch, smell, taste, sound, and sight): Several of the following are available: Items for music/noise/acoustical play; CD player; wind chimes; talking tubes; light/shade contrasts; color combinations and contrasts; leaves, bark, twigs, pine cones; grass; herbs; flowers; edible plants and/or fruit trees; colorful tiles; or other features that provide age-appropriate	This item asks for example of multiple environmental components, and also includes the term "or." This is problematic as it leaves room for variation in the way the space is rated.

stimulation and exploration with supervision.	
C2 Social & Emotional Development: The play space provides: a) Opportunities to demonstrate self-regulation and relationships (cozy, quiet niches where individual children can be alone or with an adult; calm, uncluttered environment;) accommodations for large group/small group socialization, peer to peer interaction, adult/child interaction, and individualized/private spaces (such as garden benches, porch swings, gliders, stumps, outdoor chairs, raised platform, bean teepee, playhouse, or other features that support socialization); b) Opportunities for solitary, parallel, and cooperative play (e.g., balls, bats, dramatic play props, outdoor stage, playhouse, or other features that support different stages of play); c) Accommodations that support different types of play (symbolic, rough-and-tumble, socio-dramatic, fantasy, role play, or other different types of play).	This item poses three separate subcategories of environmental support for social and emotional development. It has one rating scale to measure three distinct aspects of social and emotional development. Additionally, there is overlap between subcategories b and c; for example subcategory b lists dramatic play props and an outdoor stage, which would also qualify as accommodations that support socio-dramatic or fantasy play as listed in subcategory c.
C4 Language & Literacy: Examples of each of the following are included: Books; inviting spaces to read; mats; quilts; easels; writing tools; directional signs; children's names in print; or other play materials that support language and literacy.	This item asks for example of multiple environmental components, and also includes the term "or." This is problematic as it leaves room for variation in the way the space is rated.
E3 Manipulative and Object Control Skills Infants: The play space provides opportunities for reaching, grasping, throwing, splashing, and releasing. The play space includes several of the following: Manipulatives/toys of different weights, textures, sizes, colors, and shapes; balls of varying sizes; small containers for water; or other materials that support infants' gross motor and manipulative skills.	This item assigns one rating scale to score the play space's ability to meet both infant and toddler needs. These are two distinct sets of materials and characteristics. By using one scale to measure both, the score may not accurately measuring both elements of the play space.
Toddlers and Twos: The play space provides opportunities for throwing, underhand tossing, striking with body and with implements, pushing, catching, kicking, rolling, carrying, collecting, pedaling, transferring objects, making movement in a variety of directions/speed/levels. The play space includes several of the following: Bean bags; scarves; pine cones; tires/wheels; balls of various sizes; bats; buckets and containers; tricycles and pedal toys; or other push toys and materials that support toddlers' and twos'	

manipulative and object control skills.

G2 Shade: 25% – 50% of the play space is shaded (by trees, tall shrubs, and/or man-made shade structures).	This item would be better suited for a binary measure, as the space either does or does not provide the specified range of shade. Additionally, there is the possibility that the time of day, season or weather can influence the data collector's response, as the presence of shade will vary by the position of the play space relative to the Earth's orbit of the sun.

n=5

An additional EFA using maximum likelihood estimation and Varimax rotation was conducted on the remaining 18 items. Five factors were present, however two of them were composed of single items. Additionally, there were two items that did not load significantly onto any of the 5 factors. Removing these items, and the two single-item factors, left a total of 14 items and three factors.

A final EFA, again using maximum likelihood estimation and Varimax rotation, was conducted and identified three factors containing 7 items. The items in each construct supported different domains on the Head Start Early Learning Outcomes Framework and were assigned names accordingly. They are Social and Emotional Development; Perceptual, Motor and Physical Development; and Approaches to Learning.

Traditional and Naturalized Play Spaces

The domain scores between play spaces with varying levels of naturalness were compared. Two-group t-tests were used to test differences between the site types on the three

identified factors. The results suggested that traditional and naturalized play spaces differ in their scores on the OPSA, and naturalized spaces scored higher in each of the three constructs.

There are several plausible explanations for these differences. Item D1 measures the presence of natural elements on the play space directly. Factor three includes this item. This automatically gives play spaces that were designed with naturalness in mind a scoring advantage over traditionally designed spaces.

Another possible contributor to the differences in domain scores for traditional and naturalized play spaces is the attitudes of those involved in the development of the tool. The tool was developed by an early childhood professional with extensive experience in nature based learning and development, and initial feedback on the tool was provided by a workgroup focusing specifically on that topic. This could mean that the tool was inadvertently weighted towards natural elements; giving naturalized play spaces a clear scoring advantage. This is possibly evidenced by the presence of natural elements in several items, not limited to item D1.

The sites with high levels of naturalness did not geographically represent the total sample for the study. Research on disparities in access to nature indicates that income level may impact attitudes towards nature and investment in natural spaces (Wen, M; Harris, C.D; Holt, J.B., Croft, J.B., 2011). Using median household income as a measure of economic status, the geographical locations of the sites with highest levels of naturalness were compared with the sample as a whole (Table 12). The median household income for the study sample was $87,959. Four of the highly natural sites had lower that the sample-wide median income, while the majority came from slightly higher income areas. This indicates that income may be related to the location of natural sites, but need further study to confirm. Other possible explanations could

be access to space, materials, nature centers, local experts in nature based learning and parental or cultural values.

Table 12
Median household income by geographical location of sites

Geographical location of sites	Median 2013 Household Income
Bellevue (8)	$90,333
Bothell (1)	$74, 769
Issaquah (1)	$86,865
Mercer Island (1)	$126,359
Seattle- 98112 (2)	$96,054
Seattle- 98118 (1 site)	$42,731
Seattle- 98119 (1 site)	$21, 039

n=15

Limitations

There were several limitations to this study. First, the sample size was not adequate for the number of variables. Studies two and three were designed with the original OPSA, which contained 11 items. It was determined that 120 sites would achieve an appropriate n:v ratio. After the content validity panel, additional rating scales were added with the intent of increasing accuracy and ease of use for the tool. A total of 12 scales were added, bringing the total number of measured variables to 23. Ideally, we would have increased our participant sites to 345. Time and budget did not allow for the collection of data at additional sites.

Another limitation is the lack of natural settings available for study three. None of the 120 participating sites initially assessed were considered a naturalized play space as determined by the criteria in the appendix. A high score on the item measuring naturalness on the OPSA (D), was used to distinguish between sites with high naturalness and average or low naturalness, allowing for a comparison between more and less naturalized spaces, however the sites rated

with high naturalness may still differ by those that would be considered natural by the definition in the appendix. The definition may need to be altered, or the tool adjusted, for future consistency. Also, the difference in the sample size of the naturalized and traditional play spaces was adjusted for in analysis, but provided additional complexity to the analysis.

Additionally, none of these studies examined concurrent validity for the OPSA. Administering the OPSA with another, well-established measure such as the POEMS or related items on the ITERS, would allow exploration of concurrent validity to determine if the tool correlates well with related measures.

Directions for research

Findings from this study point to the need for further research on the OPSA and can inform future studies involving outdoor play spaces for infants and toddlers. The content validity panel saw few problems with the items on the tool in terms of representing the quality of play spaces for infants and toddlers. However, in the EFA only seven of the items loaded on to three underlying constructs, meaning the other 24 items need revision or to be removed.

If the OPSA is revised to remove redundancies and reorganized according to domains of child development, reliability and validity can be explored again; potentially on a larger scale. If the tool proves reliable and valid, it can be used not only to measure quality, but to link quality to child outcomes.

Study three showed that the natural play spaces scored higher on the OPSA than traditional play spaces. It may be that natural play spaces provide more and higher quality opportunities for development than traditional spaces; however it is also possible that the tool is skewed to favor natural play spaces. If the tool is revised, a larger study of predictive validity or concurrent validity could better assess if the tool measures aspects of both traditionally and

naturalized play spaces effectively. It is also worth investigating if certain demographic factors lead particular areas to have higher numbers of naturalized play spaces.

Data collection using the OPSA is time intensive, especially on a large scale. Future studies can consider using photographs of outdoor infant/toddler play spaces as a means of reducing time needed to collect data. Early care and education programs can be incentivized to submit photos of their play spaces for analysis, reducing the cost and time needed to collect data. Care must be taken that the photographs accurately represent the space.

Until such time as the OPSA or another infant/toddler outdoor environment tool is deemed reliable and valid, researchers exploring potential relationships between outdoor environments and child development should continue to create their own tools. Use of environmental assessment tools that relate to the specific areas of interest may prove more useful, reliable and valid the OPSA as a general measure of quality. Researchers interested in motor skill development may develop a tool measuring affordances for different types of movement including inclines, varies surfaces for crawling/walking, and balancing. They could then rate the motor skill development of infants and toddler using these spaces over time, and try to establish relationships between environmental features and motor skill development. Researchers interested in social development may develop a tool measuring environmental features that support opportunities for solitary, parallel, associative and collaborative activities including semi-private areas and sensory stimulating areas. Time scans could assess the frequency with which children were engaging in different types of play in each area.

The relationships between humans and the environment summarized in chapter one can be further explored to see if they extend to young children. As noted in the literature review, few studies focus specifically on preschoolers and outdoor environments, and fewer yet on infants

and toddlers. Research specifically on young children in early care and education settings will extend the literature on nature based learning and development and potentially identify markers of quality in outdoor environments. These markers can be used to develop a new play space assessment tool that focuses specifically on infant and toddler outdoor environmental quality.

Specifically, the POEMS tool can be administered along with measures of cognition, health, social/emotional wellbeing, and other areas connected with outdoor or natural spaces to determine a link between outdoor environments in early care and education and child development. Alternatively, the items on the ITERS that relate to outdoor environments and nature can be examined along with the measures listed above to begin exploring a relationship between the spaces infants and toddlers spend time in outdoors and their developmental outcomes. Information gathered from these studies can be used to identify markers of quality, which can be used to revise the OPSA or design a new, comprehensive tool.

A number of well-established tools can be used to measure outcomes across domains for the purposes outlined above. The Brigance Inventory of Early Development II Standardized (IED-II Standardized), measures strengths and weaknesses in physical development, language development, emergent literacy and uneasy and self-care skills in infants, toddlers and preschoolers (Brigance, 2010). The Bayley Scales of Infant and Toddler Development-Third Edition measures developmental functioning using various scales. Scales include Cognitive, Expressive Language, Receptive Language, Fine Motor, Gross Motor, Social-Emotional, and Adaptive behaviors (Bayley, 2006).

Implications for practice

The inability of the studies to demonstrate the reliability and validity of the OPSA as a measure of quality in outdoor play spaces for infants and toddlers leads to some implications for practice. It indicates that the tool may not be an appropriate measure of the quality of outdoor environments for young children, and that it may not be an effective checklist for the design of new environments. This means that other tools should be used to examine quality of existing spaces, and also in the creation of new, high quality outdoor play spaces. Revisions to the current version of the OPSA may lead to a reliable and valid measurement tool, or a new tool may be created using what is currently known about assessment development.

The importance of the outdoor environment is no less, and play spaces should continue to be evaluated for quality. Until a reliable and valid tool exists to evaluate the outdoor environment of infants and toddlers, state licensing requirements and the items on the ITERS may serve as indicators of quality. No studies were found that use these specific items on the ITERS as a measure of outdoor environmental quality, however it remains a part of comprehensive evaluations of environments.

Significant changes need to be made to the OPSA, and additional analysis of reliability and validity measures completed, before it can be used to evaluate quality of an early care and education site. The findings of the study suggest that the tool may have redundancies, and that the items measured do not represent the construct of quality as defined. To address these findings, I suggest that the tool be reorganized by the following five core domains of the Head Start Child Development and Early Learning Outcomes Framework:

1. Approaches to Learning
2. Social and Emotional Development
3. Language and Literacy
4. Cognition
5. Perceptual, Motor and Physical Development

The framework is grounded in research about what skills and abilities young children need to achieve later success in school. Each domain has specific goals for age groups starting at birth. The 2015 framework is a revision of a previous framework, which was used in section C: Planning, criteria one, but are very broad and at times redundant. Intentional reorganizing the tool to reflect these revised domains can simplify it, remove redundancies and make it more consistent with the Head Start Framework that many infant and toddler teachers may be familiar with.

A literature review identifying factors that promote development in each domain could be used to identify quality indicators for each section. In this way the tool will be rooted in research on child development and reflect opportunities for development in its measurement of quality. Careful construction can ensure that items do not duplicate play space elements across categories, as the current version does, eliminating several potential threats to reliability and validity.

Another option would be to model an infant/toddler outdoor environment measurement scale after an existing and reliable preschool outdoor assessment, such as POEMS. Using POEMS as a guide may eliminate some of the problems found with the OPSA. Alternately, modifying POEMS to reflect the emerging abilities of infants and toddlers and testing for reliability and validity could lead to an appropriate tool for assessing quality.

For centers looking for a checklist or guide to assist in designing an outdoor play space for infants and toddlers, several possibilities exist. There are various resources available to support the development of a quality outdoor play space for young children, including local and national organizations.

Several organizations focus specifically on creating natural environments for infants and toddlers. The Head Start Workgroup on Nature Based Learning and Development has a website highlighting tools and resources to help develop and use naturalized play spaces for young children. Green Hearts Institute for Nature in Childhood provides checklists for evaluating play spaces and tip sheets for adding nature to a play space. The Children in Nature Network has a collection of resources and research reviews to support development of natural setting for young children.

Several commercial enterprises create products and design environments for early care and education outdoor spaces. Nature Explore, a national organization associated with the Arbor Day Foundation, offers consultation, design plans and products to create a naturalized play space for young children. Natural Playgrounds Company consults and contracts with programs seeking to create a naturalized play space. Community Playthings provides traditional play space offerings for children birth-elementary school. These groups have specific knowledge of infant and toddler development, and experience designing environments and materials to support their development. It should be noted that commercial enterprises such as those above may recommend their own products heavily, and their recommendations should be compared with the center's needs, budget and particular population served.

Education or landscape architecture departments at colleges may have expertise in play space design. Local landscape firms and community planning groups will likely have expertise as to the types of materials and plants well suited for the climate. They also may have experience with the design of the environment itself. Care should be taken that their expertise extends specifically into the needs of infants and toddlers, as they have vastly differing needs than

preschool or elementary aged children, which are typically the intended users of public play spaces.

To summarize, three studies sought to determine if the Head Start Infant and Toddler Outdoor Play Space Assessment was a valid and reliable tool for measuring the quality of outdoor play spaces for infants and toddlers. These studies indicated that there are problematic items on the tool that prevent it from being a valid measure. With revisions and further testing, the tool may prove to be an appropriate tool to measure quality in outdoor play spaces for infants and toddlers. The creation of a new tool modeled on an existing environmental assessment is another possible option.

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Appendix A

HEAD START BODY START INFANT AND TODDLER OUTDOOR PLAY SPACE ASSESSMENT

The **Head Start Body Start Outdoor Play Space Assessment for Infants and Toddlers** has been developed to assist Early Head Start and other early childhood programs assess the quality of outdoor play spaces for infants, toddlers, and twos. Using this tool will help identify the strengths and needs of an existing outdoor play space, and serve as a basis for setting priorities and for planning enhancements and improvements. It can also be used as a tool to help plan and design a new outdoor play space.

Directions: This tool is best utilized during a walk-through of a play space. The assessment is divided into eight categories, listed in the left-hand column. **For each of the eight categories**, consider the extent to which a play space meets the given criteria. Score the play space using the rating scale, defined below and found in the center column. Circle the number that best reflects the present state of the play space based on the criteria and examples for that category. Use the right-hand column to make additional comments, such as strengths, areas for improvement, high or low priorities, ideas, donation prospects, etc. **Note:** If you are using this tool to help plan a new play space, simply ignore the Rating Scale column.

Rating Scale: 1 = Not at all 2 = Somewhat 3 = Partially 4 = Mostly 5 = Fully

Category	Rating Scale	Comments
A. WELCOMING ENVIRONMENT: ***The overall environment is welcoming, inviting, and comfortable for infants, toddlers, and adults.*** CRITERIA: 1) **Welcoming/Inviting**: *Several of the following are present*: Garden; fountain or water feature; statue; gazing ball; local cultural artifacts; whimsical signs; fence weaving; children's art; murals; non-toxic (preferably native) plants, trees, shrubs; house; flag; banner; chimes; wind sock; pergola; weather vane; deck; patio; umbrella; or other welcoming and inviting features or objects. 2) **Comfort and Routines**: *Several of the following are present*: Drinking fountain; diaper-changing	1 2 3 4 5	

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area; balance of shade and sun (trees, pergola, manufactured shade structures, open and sunny areas); sleeping/resting accommodations (mats, cots, portable cribs, quilts); places to sit, relax, rejuvenate (garden bench, porch swing, glider, outdoor chairs, vine teepee, small tent, pergola); division of spaces by activity (quiet/noisy, restful/active, wet/dry, messy/orderly); or other features that offer comfort.		
B. KEY FEATURES: ***The overall play area has a variety of manufactured and natural materials that provide developmentally and age-appropriate opportunities for infants, toddlers, and twos to experience a sense of freedom, discovery, exploration, creativity, innovation, and sensory stimulation.*** CRITERIA: 1) **Sense of Freedom**: *Several of the following are present:* Multi-purpose space; open grassy area; ride-on toy track with a variety of ride-on/wheeled toys; stepping stone path; climbing structure; steps; balls of varying sizes; sand area; balance beam; or other features that provide a sense of freedom and independence. 2) **Discovery/Exploration**: *Several of the following are available:* Bird house; bird feeder; water features (*bird bath, wading pool, recirculating fountain, dry stream bed with water pump, hose, sprinkler, mister)*;* vegetable or flower gardens; playhouse; sunflower house; gentle hills; or other features that offer discovery/exploration experiences. **** All water features require appropriate supervision.*** 3) **Creativity/Innovation**: *Several of the following are available*: A variety of topographical surfaces; a variety of work surfaces; building blocks; tree cookies; loose parts for building; balls; writing/painting/drawing/sculpture materials; colorful scarves; or other materials to encourage creativity and innovation. 4) **Sensory Stimulation** (touch, smell, taste, sound, and sight): *Several of the following are available:* Items for music/noise/acoustical play; CD player; wind chimes; talking tubes; light/shade contrasts; color combinations and contrasts; leaves, bark, twigs, pine cones; grass; herbs; flowers; edible plants and/or fruit trees; colorful tiles; or other features that provide age-appropriate stimulation and exploration with supervision.	1 2 3 4 5	
C. INTENTIONAL DESIGN: ***The overall play space reflects planning, management, and resourcing for curriculum implementation and ongoing child assessment on par with indoor play environments.*** CRITERIA: 1) **Planning**: The play space supports *all* infant and toddler developmental domains related to school readiness:		

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• *Physical Development & Health*: The play space supports opportunities to practice healthy and safe habits and personal care tasks such as dressing, toileting, washing hands, following safety rules and routines, and resting/napping. ***(See also Category E: Movement and Motor Development).*** • *Social & Emotional Development*: The play space provides: **a**) Opportunities to demonstrate self-regulation and relationships (cozy, quiet niches where individual children can be alone or with an adult; calm, uncluttered environment;) accommodations for large group/small group socialization, peer to peer interaction, adult/child interaction, and individualized/private spaces (such as garden benches, porch swings, gliders, stumps, outdoor chairs, raised platform, bean teepee, playhouse, or other features that support socialization); **b)** Opportunities for solitary, parallel, and cooperative play (e.g., balls, bats, dramatic play props, outdoor stage, playhouse, or other features that support different *stages* of play); **c**) Accommodations that support different *types* of play (symbolic, rough-and-tumble, socio-dramatic, fantasy, role play, or other different types of play). • *Approaches to Learning*: The play space provides opportunities to demonstrate attention, curiosity, persistence, and cooperation. Several of the following are available: Balls; dramatic play materials; colorful scarves; playhouse; tree cookies; building blocks; natural growth; natural and manufactured loose parts; containers for collecting and moving objects; water; large locks and keys; digging tools; or other materials and features that support a variety of approaches to learning. • *Language & Literacy*: Examples of each of the following are included: Books; inviting spaces to read; mats; quilts; easels; writing tools; directional signs; children's names in print; or other play materials that support language and literacy. • *Cognition & General Knowledge*: The play space provides opportunities to learn and demonstrate: **a)** Logic, reasoning, and problem solving (with puzzles, water flow, weather vane, rain gauge, gates with latches, loft, etc.); **b)** Mathematics knowledge and skills (with natural and manufactured loose parts (for counting, sorting, sequencing, and comparing), signs with numerals, loose parts with variation in shapes and colors, etc.); **c)** Science knowledge and skills (with magnifiers, wind chimes, weather vane, living things, containers, rain gauge, garden tools, etc.); and **d)** Social studies knowledge and skills (with miniature roads, buildings, people/families, local/community artifacts, recycling bin, etc.).	1 2 3 4 5	
2) **Management**: The outdoor space is managed similarly to the indoor classroom, including oversight, changing of toys/materials, monitoring, and continuous improvement and enhancement to support optimal learning and development.	1 2 3 4 5	
3) **Resourcing**: The outdoor space – including equipment, materials, natural and created features – has multiple, varied, defined, and multi-use learning and development areas.		

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D. NATURAL FEATURES: ***The overall play space allows and encourages children to connect with nature.*** CRITERIA: *Several of the following are apparent:* Planters; raised planting beds; bird feeder; bird house; trees for shade and climbing; umbrella; water (stream, bird bath, water hose, misters, sprinklers, water containers); flowering plants, edible fruits, vegetables; climbing vines; stumps; logs; boulders; tree cookies; long grass; pine cones; *acorns, pebbles, and/or shells*;* frogs; earthworms; bugs/insects; animals (as allowed by regulations); sand; twigs; dirt and mud; topographic variations (mounds, terraces, slopes); or other naturalized materials and features that connect children with nature. **** Small, natural, loose objects require closer supervision.***	1 2 3 4 5	
E. MOVEMENT AND MOTOR DEVELOPMENT : ***The play space supports progress in children's locomotion and traveling skills, balancing and non-locomotor skills, manipulative and object control skills, and fine motor strength and coordination skills.*** CRITERIA: 1) **Locomotion and Traveling Skills** Infants: The play space provides opportunities for movement, rolling over, crawling, scooting, sitting propped up, sitting with support, pulling up, and moving with music. *The play space includes several of the following*: Walking path; pull-up bar; push/pull toys; tunnel; vine teepee on grassy area; A-frame on grassy area; smooth logs; quilts; mats; outdoor carpet square; or other features that support the emerging locomotion and traveling skills of infants. Adults bring blankets outside to sit on the ground with non-mobile infants. Toddlers and Twos: The play space provides opportunities for moving, walking, running, hopping, jumping, marching, tiptoeing, tumbling, sliding, leaping, skipping, galloping, following the leader, riding. *The play space includes several of the following:* Push/pull toys; tricycles; wagons; wheelbarrow; wheeled toy track (with bridge, tunnel, traffic gate, photo directional signs, or variations in surface material); tree with low limbs and low step ladder; walking path; embankment slide; A-frame; vine teepee; or other features that support the emerging locomotion and traveling skills of toddlers and twos. 2) **Balancing and Non-locomotor Skills** Infants: The play space provides opportunities for "tummy time", sitting propped up, sitting without support, rolling, stretching, rocking back and forth on hands and knees, and reaching. *The play space includes several of the following*: Quilts; mats; manipulatives; pull-up bar on grassy surface; walking/crawling path; or other features that support infants' emerging mobility and balancing skills.	1 2 3 4 5 1 2 3 4 5	

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Toddlers and Twos: The play space provides opportunities for turning, swinging, swaying, squatting, standing on tiptoe, stretching, bending, balancing, reaching, wiggling, twisting, turning, jumping off, getting in and out. *The play space includes several of the following:* Swings; low ramp; walking path; balance beam; rope ladder; stairs/steps; hopscotch tiles; tent; or other features that support toddlers' and twos' emerging balancing skills. 3) **Manipulative and Object Control Skills** Infants: The play space provides opportunities for reaching, grasping, throwing, splashing, and releasing. *The play space includes several of the following:* Manipulatives/toys of different weights, textures, sizes, colors, and shapes; balls of varying sizes; small containers for water; or other materials that support infants' gross motor and manipulative skills. Toddlers and Twos: The play space provides opportunities for throwing, underhand tossing, striking with body and with implements, pushing, catching, kicking, rolling, carrying, collecting, pedaling, transferring objects, making movement in a variety of directions/speed/levels. *The play space includes several of the following:* Bean bags; scarves; pine cones; tires/wheels; balls of various sizes; bats; buckets and containers; tricycles and pedal toys; or other push toys and materials that support toddlers' and twos' manipulative and object control skills. 4) **Fine Motor, Strength and Coordination Skills** Infants: The play space provides opportunities for picking up, grasping, batting/swiping, releasing, banging, moving objects about. *The play space includes several of the following*: Natural loose parts (pine cones, leaves, sticks, etc.); musical toys; blocks; balls of various sizes; or other manipulatives, toys, or materials that support infants' emerging fine motor, strength, and coordination skills. Toddlers and Twos: The play space provides opportunities for drawing, painting, cutting, opening/closing, weaving, latching, locking/unlocking. *The play space includes several of the following:* Fence or grid for weaving; mail boxes; containers with lids; latches; gates; large keys and locks; crayons; paint brushes; scissors; spray bottles; musical instruments/toys; or other materials and features that support toddlers' and twos' emerging fine motor, strength, and coordination skills.	1 2 3 4 5 1 2 3 4 5	
F. FLEXIBILITY AND INDIVIDUALIZATION. CRITERIA: 1) The play space provides features that allow for adaptations, scaffolding, and learning and development activities that meet the changing, individualized needs of all children, including children with disabilities and special needs (e.g., wheelchair access, raised sand table, tricycle without pedals, both flat and varied walking surfaces, etc.). 2) The play space changes and evolves over time to reflect children's needs and their created	1 2 3 4 5	

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products/projects. 3) The play space supports both child- and teacher-initiated learning and development activities. 4) The play space supports solitary, parallel, and cooperative play.		
G. SAFETY, MAINTENANCE, SHADE AND STORAGE: ***The overall play space meets all relevant safety codes and regulations; receives planned, ongoing maintenance; and provides adequate and convenient storage.*** CRITERIA: 1) **Safety Codes and Regulations**: The play space meets <u>all *required*</u> local, state, and federal safety codes and regulations, and uses the following for guidance and enhanced safety: **a**) *ASTM (American Society for Testing and Materials);* **b**) *CPSC (Consumer Product Safety Commission);* **c**) *Head Start Program Performance Standards;* **d**) *NAEYC (National Association for the Education of Young Children) Academy for Early Childhood Program Accreditation; and* **e**) *state licensure regulations.* ****Infant and Toddler play space is separate from preschool play space per OHS regulations.*** *2)* **Shade:** 25% – 50% of the play space is shaded (by trees, tall shrubs, and/or man-made shade structures). 3) **Maintenance**: The play space reflects a sense of organization, is free of debris, can be easily supervised, and is well-maintained (including surfacing and sand areas) on a planned and ongoing schedule. 4) **Storage**: Adequate storage such as sheds or small outdoor buildings are used to store and organize loose parts, toys, wheeled toys, creative arts materials, child assessment materials and files, and other outdoor play materials that need protection from weather.	1 2 3 4 5	

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H. REASONABLE RISK AND CHALLENGE: ***The overall play space provides both risk and challenge appropriate to children's emerging skills.***	1 2 3 4 5	
CRITERIA:		
1) The play space provides a sense of freedom with open areas for running, big body movements, and rough-and-tumble play.		
2) The play space includes areas that provide a sense of comfort, coziness, and solitude while also being easily supervised by adults (e.g., pergola, small chairs, small tents, nooks, hideaways, low hedges, quilts/mats for infants, etc.).		
3) The play space provides areas and equipment that promote reasonable risk and challenge to support emerging skills and development (such as trees to climb, low step ladders, lofts, uneven walking path, pergola, shrubs, dirt, etc.).		
4) The play space provides safe but stimulating features for children to self-assess their capabilities and skills (such as climbers, steps, topographical variations, garden tools, musical/acoustical feature).		
5) The play space provides materials, equipment, and features that promote independence, self-regulation, and a sense of confidence (such as water hose, gate with latch, wheeled toys for pushing and riding, bird feeder, etc.).		

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Appendix B

HEAD START BODY START INFANT AND TODDLER OUTDOOR PLAY SPACE ASSESSMENT

The **Head Start Body Start Outdoor Play Space Assessment for Infants and Toddlers** has been developed to assist Early Head Start and other early childhood programs assess the quality of outdoor play spaces for infants, toddlers, and twos. Using this tool will help identify the strengths and needs of an existing outdoor play space, and serve as a basis for setting priorities and for planning enhancements and improvements. It can also be used as a tool to help plan and design a new outdoor play space.

Directions: This tool is best utilized during a walk-through of a play space. The assessment is divided into eight categories, listed in the left-hand column. **For each of the eight categories**, consider the extent to which a play space meets the given criteria. Score the play space using the rating scale, defined below and found in the center column. Circle the number that best reflects the present state of the play space based on the criteria and examples for that category. Use the right-hand column to make additional comments, such as strengths, areas for improvement, high or low priorities, ideas, donation prospects, etc. **Note:** If you are using this tool to help plan a new play space, simply ignore the Rating Scale column.

Rating Scale: 1 = Not at all 2 = Somewhat 3 = Partially 4 = Mostly 5 = Fully

Category	Rating Scale	Comments
A. WELCOMING ENVIRONMENT: ***The overall environment is welcoming, inviting, and comfortable for infants, toddlers, and adults.*** CRITERIA: **1. Comfort and Routines**: *Several of the following are present*: Drinking fountain; diaper-changing area; balance of shade and sun (trees, pergola, manufactured shade structures, open and sunny areas); sleeping/resting accommodations (mats, cots, portable cribs, quilts); places to sit, relax, rejuvenate (garden bench, porch swing, glider, outdoor chairs, vine teepee, small tent, pergola); division of spaces by activity (quiet/noisy, restful/active, wet/dry, messy/orderly); or other features that offer comfort.	1 2 3 4 5	
B**. KEY FEATURES:** ***The overall play area has a variety of manufactured and natural materials that provide developmentally and age-appropriate opportunities for infants, toddlers, and twos to experience a sense of freedom, discovery, exploration, creativity, innovation, and sensory stimulation.*** CRITERIA: **1) Sense of Freedom**: Several of the following are present: Multi-purpose space; open grassy area; ride-on toy track with a variety of ride-on/wheeled toys; stepping stone path; climbing structure; steps; balls of varying sizes; sand area; balance beam; or other features that provide a sense of freedom and independence. **2) Discovery/Exploration:** Several of the following are available: Bird house; bird feeder; water features (bird bath, wading pool, recirculating fountain, dry stream bed with water pump, hose, sprinkler, mister)*; vegetable or flower gardens; playhouse; sunflower house; gentle hills; or other features that offer discovery/exploration experiences. * All water features require appropriate supervision. **3) Creativity/Innovation:** Several of the following are available: A variety of topographical surfaces; a variety of work surfaces; building blocks; tree cookies; loose parts for building; balls; writing/painting/drawing/sculpture materials; colorful scarves; or other materials to encourage creativity and innovation. **4) Sensory Stimulation** (touch, smell, taste, sound, and sight): Several of the following are available: Items for music/noise/acoustical play; CD player; wind chimes; talking tubes; light/shade contrasts; color combinations and contrasts; leaves, bark, twigs, pine cones; grass; herbs; flowers; edible plants and/or fruit trees; colorful tiles; or other features that provide age-appropriate stimulation and exploration with supervision.	1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5	
C. INTENTIONAL DESIGN***: The overall play space reflects planning, management, and resourcing for curriculum implementation and***		

ongoing child assessment on par with indoor play environments. CRITERIA: **1) Planning:** The play space supports all infant and toddler developmental domains related to school readiness:		
i. Physical Development & Health: The play space supports opportunities to practice healthy and safe habits and personal care tasks such as dressing, toileting, washing hands, following safety rules and routines, and resting/napping. (See also Category E: Movement and Motor Development).	1 2 3 4 5	
ii. Social & Emotional Development: The play space provides: a) Opportunities to demonstrate self-regulation and relationships (cozy, quiet niches where individual children can be alone or with an adult; calm, uncluttered environment;) accommodations for large group/small group socialization, peer to peer interaction, adult/child interaction, and individualized/private spaces (such as garden benches, porch swings, gliders, stumps, outdoor chairs, raised platform, bean teepee, playhouse, or other features that support socialization); b) Opportunities for solitary, parallel, and cooperative play (e.g., balls, bats, dramatic play props, outdoor stage, playhouse, or other features that support different stages of play); c) Accommodations that support different types of play (symbolic, rough-and-tumble, socio-dramatic, fantasy, role play, or other different types of play).	1 2 3 4 5	
iii. Approaches to Learning: The play space provides opportunities to demonstrate attention, curiosity, persistence, and cooperation. Several of the following are available: Balls; dramatic play materials; colorful scarves; playhouse; tree cookies; building blocks; natural growth; natural and manufactured loose parts; containers for collecting and moving objects; water; large locks and keys; digging tools; or other materials and features that support a variety of approaches to learning.	1 2 3 4 5	
iv. Language & Literacy: Examples of each of the following are included: Books; inviting spaces to read; mats; quilts; easels; writing tools; directional signs; children's names in print; or other play materials that support language and literacy.	1 2 3 4 5	
v. Cognition & General Knowledge: The play space provides opportunities to learn and demonstrate: a) Logic, reasoning, and problem solving (with puzzles, water flow, weather vane, rain gauge, gates with latches, loft, etc.); b) Mathematics knowledge and skills (with natural and manufactured loose parts (for counting, sorting, sequencing, and comparing), signs with numerals, loose parts with variation in shapes and colors, etc.);	1 2 3 4 5	

vi. Science knowledge and skills (with magnifiers, wind chimes, weather vane, living things, containers, rain gauge, garden tools, etc.); and d) Social studies knowledge and skills (with miniature roads, buildings, people./families, local/community artifacts, recycling bins, etc.) **2) Management:** The outdoor space is managed similarly to the indoor classroom, including oversight, changing of toys/materials, monitoring, and continuous improvement and enhancement to support optimal learning and development. **3) Resourcing:** The outdoor space – including equipment, materials, natural and created features – has multiple, varied, defined, and multi-use learning and development areas.	1 2 3 4 5 1 2 3 4 5 1 2 3 4 5	
D. NATURAL FEATURES: ***The overall play space allows and encourages children to connect with nature****.* CRITERIA: *Several of the following are apparent:* Planters; raised planting beds; bird feeder; bird house; trees for shade and climbing; umbrella; water (stream, bird bath, water hose, misters, sprinklers, water containers); flowering plants, edible fruits, vegetables; climbing vines; stumps; logs; boulders; tree cookies; long grass; pine cones; acorns, pebbles, and/or shells*; frogs; earthworms; bugs/insects; animals (as allowed by regulations); sand; twigs; dirt and mud; topographic variations (mounds, terraces, slopes); or other naturalized materials and features that connect children with nature. **** Small, natural, loose objects require closer supervision.***	1 2 3 4 5	
E. MOVEMENT AND MOTOR DEVELOPMENT : ***The play space supports progress in children's locomotion and traveling skills, balancing and non-locomotor skills, manipulative and object control skills, and fine motor strength and coordination skills.*** CRITERIA: **1) Locomotion and Traveling Skills** <u>Infants:</u> The play space provides opportunities for movement, rolling over, crawling, scooting, sitting propped up, sitting with support, pulling up, and moving with music*. The play space includes several of the following:* Walking path; pull-up bar; push/pull toys; tunnel; vine teepee on grassy area; A-frame on grassy area; smooth logs; quilts; mats; outdoor carpet square; or other features that support the emerging locomotion and traveling skills of infants. Adults bring blankets outside to sit on the ground with non-mobile infants. <u>Toddlers and Twos:</u> The play space provides opportunities for moving, walking, running, hopping, jumping, marching, tiptoeing, tumbling, sliding, leaping, skipping, galloping, following the leader, riding. *The play space*	1 2 3 4 5	

includes several of the following: Push/pull toys; tricycles; wagons; wheelbarrow; wheeled toy track (with bridge, tunnel, traffic gate, photo directional signs, or variations in surface material); tree with low limbs and low step ladder; walking path; embankment slide; A-frame; vine teepee; or other features that support the emerging locomotion and traveling skills of toddlers and twos. **2) Balancing and Non-locomotor Skills** Infants: The play space provides opportunities for "tummy time", sitting propped up, sitting without support, rolling, stretching, rocking back and forth on hands and knees, and reaching. The play space includes several of the following: Quilts; mats; manipulatives; pull-up bar on grassy surface; walking/crawling path; or other features that support infants' emerging mobility and balancing skills. Toddlers and Twos: The play space provides opportunities for turning, swinging, swaying, squatting, standing on tiptoe, stretching, bending, balancing, reaching, wiggling, twisting, turning, jumping off, getting in and out. *The play space includes several of the following:* Swings; low ramp; walking path; balance beam; rope ladder; stairs/steps; hopscotch tiles; tent; or other features that support toddlers' and twos' emerging balancing skills. **3) Manipulative and Object Control Skills** Infants: The play space provides opportunities for reaching, grasping, throwing, splashing, and releasing. *The play space includes several of the following:* Manipulatives/toys of different weights, textures, sizes, colors, and shapes; balls of varying sizes; small containers for water; or other materials that support infants' gross motor and manipulative skills. Toddlers and Twos: The play space provides opportunities for throwing, underhand tossing, striking with body and with implements, pushing, catching, kicking, rolling, carrying, collecting, pedaling, transferring objects, making movement in a variety of directions/speed/levels. *The play space includes several of the following:* Bean bags; scarves; pine cones; tires/wheels; balls of various sizes; bats; buckets and containers; tricycles and pedal toys; or other push toys and materials that support toddlers' and twos' manipulative and object control skills. **4) Fine Motor, Strength and Coordination Skills** Infants: The play space provides opportunities for picking up, grasping, batting/swiping, releasing, banging, moving objects about. *The play space includes several of the following:* Natural loose parts (pine cones, leaves, sticks, etc.); musical toys; blocks; balls of various sizes; or other manipulatives, toys, or materials that support infants' emerging fine motor, strength, and coordination skills.	1 2 3 4 5 1 2 3 4 5	

Toddlers and Twos: The play space provides opportunities for drawing, painting, cutting, opening/closing, weaving, latching, locking/unlocking. *The play space includes several of the following:* Fence or grid for weaving; mail boxes; containers with lids; latches; gates; large keys and locks; crayons; paint brushes; scissors; spray bottles; musical instruments/toys; or other materials and features that support toddlers' and twos' emerging fine motor, strength, and coordination skills.	1 2 3 4 5	
F. FLEXIBILITY AND INDIVIDUALIZATION. CRITERIA: 1)The play space provides features that allow for adaptations, scaffolding, and learning and development activities that meet the changing, individualized needs of all children, including children with disabilities and special needs (e.g., wheelchair access, raised sand table, tricycle without pedals, both flat and varied walking surfaces, etc.). 2) The play space supports both child- and teacher-initiated learning and development activities. 3) The play space allows for solitary, parallel and cooperative play	 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5	
G. SAFETY, MAINTENANCE, SHADE AND STORAGE: ***The overall play space meets all relevant safety codes and regulations; receives planned, ongoing maintenance; and provides adequate and convenient storage.*** CRITERIA: **1) Shade:** 25% – 50% of the play space is shaded (by trees, tall shrubs, and/or man-made shade structures). **2) Maintenance:** The play space reflects a sense of organization, is free of debris, can be easily supervised, and is well-maintained (including surfacing and sand areas) on a planned and ongoing schedule. **3)Storage**: Adequate storage such as sheds or small outdoor buildings are used to store and organize loose parts, toys, wheeled toys, creative arts materials, child assessment materials and files, and other outdoor play materials that need protection from weather.	 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5	
H. REASONABLE RISK AND CHALLENGE***: The overall play space provides both risk and challenge appropriate to children's emerging skills.*** CRITERIA: 4) The play space provides safe but stimulating features for children to self-assess their capabilities and skills (such as climbers, steps, topographical variations, garden tools, musical/acoustical feature).	 1 2 3 4 5	

Appendix C

Criteria for naturalized play space

1. The space incorporates natural elements including sand, water, soil, living plants, rocks, logs and stumps into both hardscapes and loose parts.
2. There are opportunities for children to interact with nature in active and passive ways.
3. While man-created play structures from materials such as plastic and coated metal may be present, they are not the focus of the play space and do not account for a majority of space.

Appendix D

Defining the construct of quality in infant and toddler outdoor environments:

Quality in outdoor environments refers to the ability of the environment to support child development across social-emotional, physical, and cognitive domains. A quality outdoor play space provides developmentally appropriate opportunities for environmental and interpersonal interactions. The environment promotes development while ensuring reasonable safety for infants and toddlers.