

Unique Contribution of Outdoor Environmental Quality to Children's Cognitive and Emotional Experiences: A Comparison of Measures

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INTRODUCTION

Research on indoor environments in child care settings has established that classroom quality is important for promoting positive development in young children. (NICHD, 2002; NICHD & Duncan, 2003; Vandell et al., 2010)

Research regarding outdoor environments has also demonstrated that the quality of materials, interactions, and experiences outdoors are as important for children's development as indoor experiences. (DeBord, Hestenes, Moore, Cosco, & McGinnis, 2002)

Specifically, outdoor experiences are linked to children's:

- gross motor ability (Fjortoft, 2001)
- social skills and behavior problems (Coffey, 2001; Moore & Cosco, 2000)
- concentration and observational skills (Faber Taylor et al. 2001; Pyle, 2002)
- creativity and imagination (Crain, 1997; Louv, 2005)

However, there is little work demonstrating associations between outdoor environments and children's executive function and emotional experiences (Hartle, 1994). Additionally, there is a lack of information concerning the relationships among measures of indoor and outdoor quality and child outcomes.

PURPOSE

The purpose of this study was to examine the unique contribution of the outdoor environment to children's cognitive skills and emotional experiences, above and beyond indicators of indoor classroom quality.

METHOD

Sample:

97 preschool teachers and 422 children (ages 3 to 5) from child care centers across one state.

Instruments:

Teachers were observed using a wide range of quality measures:

- Early Childhood Environment Rating Scale-Revised (ECERS-R)
- Early Childhood Environment Rating Scale-Extension (ECERS-E)
- Classroom Assessment Scoring System, Pre-K (CLASS)
- Preschool Outdoor Environment Measurement Scale (POEMS)
 - 56 items assessing five domains: Physical Environment, Interactions, Play and Learning Settings, Program, and Teacher/Caregiver Role.

Children's outcomes were measured using:

- Attentional Flexibility - Flexible Item Selection Task (FIST)
 - Direct assessment of children's abstraction and flexible thinking skills using a card matching and sorting task.
- Positive and negative emotional experiences - Contentedness and Comfort of Children in Child Care (C5 Scale)
 - Observational measure of the frequency of children's positive and negative emotional expressions in the classroom (e.g., joyful, sad, angry, bored, etc.). Observations occurred during the ECERS-R assessments.

RESULTS: DESCRIPTIVES AND CORRELATIONS

Table 1: Descriptives for Key Variables

	Mean	SD	Minimum	Maximum
Total POEMS score	30.94	6.93	15.00	48.00
Natural Elements score*	4.45	2.38	0.00	12.00
FIST_B Score (1=correct)	.149	.245	0	1
C5 Positive score	3.84	.602	2.14	5.00
C5 Negative score	1.31	.322	.71	2.38

*Natural Elements – The sum of natural elements present in the outdoor environment (29 indicators total) with which children were able to interact.

Table 2: Descriptives for participating children

	Mean	SD	Minimum	Maximum
Child sex (1=male)	.48	.50	-	-
Child age (in months)	48.47	8.22	32	69
Number of hours in care (per week)	37.42	8.85	6	60

As hypothesized, measures of outdoor and indoor quality were correlated moderately.

Table 3. Bivariate correlations between quality measures

	ECERS-R (n = 96)	ECERS-E (n=91)	CLASS Emotional Support (n = 96)	CLASS Instruct. Support (n = 96)	CLASS Classroom Org. (n = 96)	POEMS (n = 95)
ECERS-R	---					
ECERS-E	.51**	---				
CLASS Emotional Support	.48**	.60**	---			
CLASS Instruct. Support	.48**	.52**	.51**	---		
CLASS Classroom Org.	.49**	.59**	.91**	.48**	---	
POEMS	.45**	.47**	.35**	.22*	.39**	---

RESULTS: REGRESSIONS

Cognitive Outcomes:

▪ Regression analyses indicated that only outdoor quality was predictive of children's flexible thinking, even when controlling for child age, global quality (as measured by the ECERS-R), and QRIS star-rated license (see Table 4). This relationship accounted for 25% of the variance in children's FIST scores.

Natural Elements

▪ Post hoc analyses revealed that the subset of items reflecting natural elements of the outdoor environment were predictive of children's flexible thinking, controlling for child age and global quality. The coefficients are as follows: natural elements ($\beta = .120$, $t = 1.995$, $p = .047$), child age ($\beta = .359$, $t = 6.042$, $p = .000$), and global quality ($\beta = .018$, $t = .304$, $p = .761$).

Emotional Outcomes:

▪ Both outdoor and indoor quality measures predicted children's positive and negative emotional experiences in child care settings (see Table 4).

▪ The quality of the outdoor environment was the strongest predictor of children's positive emotional experiences after controlling for star level and global quality (measured by ECERS-R).

▪ Outdoor quality also emerged as a significant negative predictor of children's negative emotional experiences, similar to global quality (ECERS-R) and process quality (CLASS Classroom Organization and Emotional Support).

Table 4. Regression models predicting child outcomes from quality measures

Quality Assessment Tool	Outcome 1 FIST: Exec. Function		Outcome 2 C5: Positive Emotions		Outcome 3 C5: Negative Emotions	
	β	Model R ²	β	Model R ²	β	Model R ²
ECERS-R	-.004	.21	.579***	.25	-.292***	.10
ECERS-E	.017	.22	.064	.27	.043	.11
CLASS Emotional Support	-.001	.16	.098*	.31	-.119*	.12
CLASS Instructional Support	.037	.16	.098*	.31	-.095	.12
CLASS Classroom Organization	.042	.16	.148**	.32	-.163***	.13
POEMS	.242***	.25	.227***	.29	-.142*	.11

CONCLUSIONS

These results demonstrate that outdoor environments are important to young children's executive function, as well as their positive and negative emotional experiences. Because relatively little attention and resources are allocated to improving the quality of outdoor settings in child care, these results are particularly valuable. Exposure to natural settings has been shown to increase older children's ability to focus and enhance cognitive skills, as well as to reduce stress (Faber Taylor et al. 2001; Wells, 2000; Wells & Evans, 2003). These results suggest outdoor settings and natural environments may be equally important for young children's development and are worthy of further investigation.

Implications

As the findings show, both outdoor and indoor quality are essential to creating child care environments that promote children's cognitive and emotional development. This also highlights the need for including the assessment and improvement of outdoor environments in Quality Rating and Improvement Systems and other quality enhancement and professional development efforts.

Although there is some evidence that the natural elements are most important to children's cognitive outcomes, further research is needed to identify the specific aspects of outdoor environments that contribute to children's development, including the processes that promote higher order thinking and positive emotional experiences.

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