

**Effects of Home Environment and Preschool Childcare Quality on
Early Cognitive and Social Skills**

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Abstract

Realizing a number of children in early childhood are not sufficiently prepared to enter school, this study was designed to examine and improve contextual features of the home and preschool environment for school readiness. Little research has explored the association between household chaos and children's development of cognitive skills and social competence. Additionally, as several states in the US have launched state government-funded "Quality Rating and Improvement System (QRIS)" to improve the quality of early childhood education, an evaluation of the system was needed. The current study examined the links among household chaos, QRIS quality, and children's cognitive and social skills, using a sample of 4844 parents with a preschool age child from 568 QRIS rated preschool programs in Ohio. Analysis revealed that a disorganized and chaotic home environment was a significantly unique risk factor of a child's social competence after controlling for the child age, gender and family SES. There was little evidence of QRIS influences on child cognitive skills and social competence, and no significant moderating effect of QRIS between the relationship of household chaos and child outcomes; however, this study guided future research on QRIS and home environment. Finally, this study emphasized the importance of early childhood intervention and prevention programs for young children's school readiness.

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Introduction

Early childhood is a significant period for development of early cognitive and social skills. Early language and cognitive skills in preschool-age children strongly predict their school readiness and future academic achievement (Baydar, Brooks-Gunn, & Furstenberg, 1993; Lonigan, Burgess, & Anthony). In addition, the ability to manage behaviors and build meaningful peer relationship in early childhood is an important predictor of success in school (Ladd & Price, 1987; Ladd, Kochenderfer, & Coleman, 1996; La Paro & Pianta, 2000; Webster-Stratton & Reid, 2004). However, in a study of kindergarten teachers, national sample of teachers reported that 16% of children enter kindergarten without basic academic and social skills which affect children's ability to follow directions or work in group activity (Rimm-Kaufman, Pianta, & Cox, 2000).

To improve children's school readiness in terms of cognitive skills and social competence, researchers have investigated several possible predictors within the home that might influence the lack of cognitive and social ability in preschool age, including family socioeconomic status (e.g., Eamon, 2001; Tulkin, 1973) and home environment (e.g., Foster, Lambert, Abbott-Shin, McCarty, & Franze, 2005). In particular, environmental confusion in the home has been established as one of the primary processes which predict children's school readiness (Matheny, Wachs, Ludwig, & Phillips, 1995). Usually, environment confusion is characterized by a "chaotic home environment," which is defined as "frenetic activity, lack of structure, unpredictability in everyday activities, and high levels of ambient situations" (Bronfenbrenner & Evans, 2000). There was evidence that household chaos influences a wide range of child outcomes (Bronzaft & McCarthy, 1975; Coldwell, Pike, & Dunn, 2006).

Additionally, the quality of early childhood education and care is another significant predictor of children's early cognitive and social development (Phillips, McCartney, & Scarr,

1987). As society becomes more industrialized, women leave home for the workforce, and more children are sent to a child-care institution such as day-care or preschool (Bronfenbrenner, 1976). According to the recent census report, 64% of US women with children under age 6 participate in the labor force, and the percentage has steadily increased since the 1970s (U.S. Department of Labor, 2009). Thus, there has been increased attention on the impact of preschool on children's development, and in particular, researchers have investigated the relationship between the quality of the preschool experience and child outcomes as they relate to improved school readiness (e.g., Anderson, 1989; Phillips et al., 1987). In general, high quality preschool experiences have significant positive impact on vulnerable children (Schweinhart & Weikart, 1981; Schweinhart et al., 2005). As a result, policy makers in several states have recently launched 'Quality Rating and Improvement System (QRIS)' to evaluate and heighten child-care quality by defining quality standards (Zellman & Perlman, 2008). Despite their growing popularity, the impact of these efforts has not been established.

Addressing the mechanisms in the ecological systems theory, the primary goal of the current study is to examine the links among children, families, and preschool, using a sample of families with a preschool age child from QRIS rated preschool programs in Ohio.

Current Study

Because children spend a large amount of time at home and preschool, the home environment and the quality of preschool are expected predictors of child outcomes. Using a sample of children in Ohio SUTQ rated programs, this study aims to understand specific contextual predictors, the chaotic home environment and SUTQ star rating levels, which are associated with children's school readiness. To examine the unique contributions of household chaos and preschool quality above and beyond children's genetic and family socioeconomic status (SES) influences, children's age, gender, and family SES will be controlled. When

children are exposed to the two different settings of home and preschool, they can gain benefits from the interaction between two contexts (Bronfenbrenner, 1994). Because there is a lack of research examining the interaction between two contexts, this study will investigate the interaction between home chaos and preschool experience.

Methods

Participants

Data was collected on 4844 children enrolled in 568 SUTQ rated programs in Ohio. Of 4844 children, 2307 (47.6%) were boys and 2483 (51.3%) were girls (Table 1). The age of children ranged from 40 months to 68 months ($M=54.11$, $SD=.68$). Ethnic distribution of children was 72% White, 21% African American, 1% American Indian/Alaskan Native, 3% Asian American, and 3% other. In the majority of families, the primary caregiver was a mother ($N=4355$, 89.9%), in 301 (6.2%) it was a father, in 78 (1.5%) it was a grandparent, and in 50 (1%), the primary caregiver was “other.” For the purposes of these analyses, all were included as “parents.” The average age of parents was 34 years ($SD=7$, ranged from 20 to 65). Ethnic distribution of parents was 77% White, 17.8% African American, 1% American Indian/Alaskan Native, 2% Asian American, and 2.2% other. A majority (71.9%) of respondents were living with spouse or partner. The average total annual income for families ranged from \$40,001 to \$50,000, and the average parent respondent’s highest education level was Associate of arts (A.A.) degree.

Procedures

For the study, administrators in SUTQ rated programs received a project packet, with administrator, teachers, and parents consent forms and questionnaires by mail. In each program, 2 teachers and 30 parents were provided consent forms and questionnaires by the administrator.

The packets also contained return envelopes. Data from questionnaires were entered using scannable forms, which allowed for efficient data entry.

Measures

Demographic. As a part of the parent questionnaire, demographic questions asked children's age, gender, race/ethnicity and the relationship with a primary caregiver, and primary caregivers' age, race/ethnicity, highest level of education, marital status and household income. Family socioeconomic status (SES) was measured using a primary caregiver's highest level of education and household income, following past studies of children's early outcome (e.g., Hart, Petrill, Deater, Decker, & Thompson, 2007; Johnson et al., 2008).

Chaos of Household. The short version of the Confusion, Hubbub, and Order Scale (CHAOS, the original version from Matheny et al., 1995; the short version from Petrill et al., 2004) was used to measure environmental confusion in home. Parents respond to a total of six items describing the level of chaos in their home, using a 5-point scale (1 = *Definitely Untrue*, 5 = *Definitely True*). A higher score represents more chaotic, disorganized, and hurried characteristics at home. The single score was created by obtaining a mean of responses for the six items, including 3 reverse items; 'The children have a regular bedtime routine,' 'We are usually able to stay on top of things,' and 'The atmosphere in our house is calm.' Internal consistency in the original scale was moderate (Cronbach's $\alpha = .79$) and it has been correlated to observational measurement of home environment (Matheny et al., 1995). Internal consistency in the short version was lower than typically reported for the longer version (Cronbach's $\alpha = .63$), but still in the acceptable range (Petrill et al., 2004).

Preschool quality. SUTQ rating level was used to represent the quality of childcare center.

SUTQ is a voluntary preschool quality rating system created by the Ohio Department of Job and

Family Services to improve the quality of early care and education programs in Ohio. This system has three quality levels above Ohio's licensing standards (1, 2, or 3). A high rating represents high quality of programs; fewer children per classroom, better trained teachers, a more comprehensive early education experience for children, and a focus on continuous improvement. SUTQ benchmarks are provided in Table 2. In this sample, 2869 children (59.2%) were in level 1 programs, 1047 children (21.6%) were in level 2 programs, and 892 children (18.4%) were in level 3 programs.

Child outcomes. Children's early cognitive skills and social functioning were measured by parents' responses, using two of five broad domains (language and cognitive development; and social knowledge and competence) in the Early Development Instrument (EDI, Janus & Offord, 2007), which is designed to provide an assessment of children's readiness to learn at school. A "Language and Cognitive Development" domain contains 26 items with yes/no responses (full domain internal consistency, Cronbach's $\alpha = .91$). All answers are scored a 10 (yes) if a child has a skill or 0 (no) if the child does not have a skill. A "Social Competence" domain consisted of 26 items (full domain internal consistency, Cronbach's $\alpha = .95$) with a 3-point scale: 'Often or very true' (10), 'Sometimes or somewhat true' (5), and 'Never or not true' (0). Latent variables for each sub-construct were calculated by a mean of valid answers (Janus & Offord, 2007).

Data Analysis Plan

To interpret child outcome variables, Exploratory Factor Analysis (EFA) will be conducted, using the Comprehensive Exploratory Factor Analysis (CEFA) program (Browne, Cudeck, Tatenene, & Mels, 2004). Janus and Offord (2007) provided factor structure, however, their sample was made up of kindergarten children in Canada, a different target population than the current study, preschool children in the US. Thus, EFA is needed to avoid imposing

preconceived ideas on the analysis and to detect any possible changes. In primary analysis, using SPSS 17.0, a series of hierarchical multiple regression analyses will be completed to examine the unique contribution of predictors (Cohen & Cohen, 1983). To examine moderator hypothesis, significance of interaction between the independent variable and the moderating variable will be tested in the last step of hierarchical multiple regression models (Baron & Kenny, 1986).

Results

Exploratory Factor Analysis

An exploratory factor analysis (EFA) was conducted to create latent variables for the child cognitive skills and social competence scale in the EDI. There were four emerging factors for the cognitive scale and five emerging factors for the social scales, having an eigenvalue over 1.0. The RMSEA values of both models were less than .05, in the range of a close fit. In the next step, the items for which the factor loadings were less than .40 were dropped for model modification. Among 9 latent variables, 3 variables were excluded because of high skewness and kurtosis, thus, 6 factors were used in the primary analyses: Recognition of letters and numbers, basic language skills, peer relationships, respect, conformance to classroom norms, and learning approach.

Primary Analyses

The sets of hierarchical regression analyses were implemented to test hypotheses in this study. The first hypothesis predicted the association between household chaos and child outcomes. To control for child characteristics (age and gender) and family SES (income and maternal education), these 4 variables were entered in the first block. As shown in Table 2, there was no significant relationship between household chaos and child cognitive skills, However, household chaos showed a unique contribution to differences in all of domains of social

competence, $\beta = -.16$ ($p < .01$) in the ‘peer relationship’ domain; $\beta = -.25$ ($p < .01$) in the ‘respect’ and the ‘conformance to classroom norms’ domain; and $\beta = -.18$ ($p < .01$) in the ‘learning approach’ domain. The proportion of variance explained was $\Delta R^2 = .02$, $\Delta F(1,3738)$, $p < .01$ in the ‘peer relationships’ domain; $\Delta R^2 = .06$, $\Delta F(1,3731)$, $p < .01$ in the ‘respect’ domain; $\Delta R^2 = .06$, $\Delta F(1,3733)$, $p < .01$ in the ‘conformance to classroom norms’ domain; and $\Delta R^2 = .03$, $\Delta F(1,3732)$, $p < .01$ in the ‘learning approach’ domain. Overall, more chaotic home environment predicted negative child outcomes in social competence. Further, ‘respect’ and ‘conformance to classroom norms’ were more predicted by household chaos than other outcomes.

To test the effectiveness of high quality preschool program on the development of cognitive skills and social competence, SUTQ level was entered in block 2 of a hierarchical regression analysis model (Table 3). Control variables in block 1 were the same with the previous model. SUTQ level was a significant predictor in the ‘respect’ domain ($\beta = .03$, $p < .05$) and the ‘conformance to classroom norms’ domain ($\beta = .03$, $p < .05$), thus indicating that children in the three-star programs significantly had more abilities to show respect to others and to conform to classroom norms than those who were in the one-star or two-star programs. However, standardized regression coefficient was low and this predictor only accounted for 0.1% of the total variance in both of domains ($\Delta F(1,3717)$, $p=.047$ in the ‘respect’ domain; $\Delta F(1,3719)$, $p=.046$ in the ‘conformance to classroom norms’ domain) .

The final hypothesis predicted a moderating effect of preschool quality on the association between household chaos and child outcomes. The same control variables were entered in block 1, and household chaos and SUTQ level were entered together in block 2 to compare their unique contributions. Finally, an interaction term of ‘household chaos \times SUTQ level’ was entered in block 3. In the final step, there was no significant effect of interaction terms,

indicating that there is no moderating effect of SUTQ level between the relationship of household chaos and child outcomes.

Discussion

The aim of this study was to understand the links among children, families, and preschool, using a sample of families with a preschool age child from QRIS rated preschool programs in Ohio. Realizing a number of children in early childhood are not sufficiently prepared to enter school (Rimm-Kaufman et al., 2000), this study was designed to examine and improve contextual features of the home and preschool environment for school readiness. In the present study, children's school readiness was represented by their cognitive skills and social competence: recognition of letters and numbers, basic language skills, peer relationships, showing respect to other people, conformance to classroom norms, and organized approach to learning. In general, these abilities in early childhood were significant predictors of success in school (Ladd & Price, 1987; Ladd et al., 1996).

First, this study included several predictors as control variables which might influence the child development in all sets of hierarchical regression analyses. The results showed that children's fixed characteristics such as age and gender, and household income were significant factors which might potentially limit the possibilities for children's outcomes. This study implies the importance of controlling for background factors in the data analyses.

Second, the unique contributions of home chaos and SUTQ star rating levels to differences in social competence were examined after controlling for child age, gender and family SES. As hypothesized, household chaos was a distinct predictor of children's social competence, showing that a high degree of household chaos was associated with preschool children's less social competence in all of domains. The lack of abilities to build positive peer

relationships may be due to less opportunity to experience well-organized communications and interactions in a chaotic home environment. There has also been evidence that household chaos predicted young children's problem behaviors, and these problem behaviors may cause the rejection or avoidance from peers (Coldwell et al., 2006). Further, this study found that children in a chaotic home environment showed less respect to other people. Dunham et al. (1991) suggested that children in unpredictable physical environment were less sensitive and attentive to detect social cues. Difficulties in paying attention to other people's needs or noticing social cues may cause a lack of abilities to show respect. Additionally, the results showed that children who live in disorganized and chaotic circumstances had limited abilities to follow classroom norms or routines, and organize learning steps. This may be due to a lack of modeling in the disorganized home environment.

For the effectiveness of SUTQ on child outcomes, there were only a few findings in terms of social competence in this study. Children who were in the three-star programs showed more abilities to respect others and follow classroom norms than those who were in the one-star or two-star programs. It is possible to assume that children can experience closer relationships with peers or teachers in the three-star programs due to the small group size. In turn, this may allow children to learn how respect others. Further, children in three-star programs may be able to learn how to follow rules and norms from more trained teachers and well-organized atmosphere. However, these specific indicators of SUTQ were not separately measured in this study, therefore, it should be carefully interpreted. Additionally, SUTQ only accounted for 0.1% of variance in both of domains. The low variance may be explained by measurement issues. This study did not consider longer-term effects of SUTQ because child outcome was measured by a cross-sectional test. Furthermore, how long a child stayed in the program should be considered in

the future research to measure the effectiveness of star levels more accurately, though it is a cross-sectional test. Another possible explanation may be due to the lack of validity of SUTQ. Because SUTQ is a new policy, more efforts to validate star levels will be needed.

Third, based on ecological systems theory (Bronfenbrenner, 1994), the interaction term of the two different settings of home and preschool was brought in this study to test the moderating effects of SUTQ between the relationships of home chaos and school readiness. In specific, it was expected that even though a child lives in a chaotic home environment, if the child attends the three-star programs, the impact of household chaos on child outcomes will be decreased. However, this final hypothesis was not supported. One possible explanation for this result may be due to the lack of correlation between SUTQ and child outcomes. Another explanation may come from the variable used to assess home environment. Theoretically, home and preschool environment were assumed to interact with each other (Bronfenbrenner, 1976); however, this study only used household chaos among numerous indicators in the home.

Limitations

The limitations of the current study should be considered when interpreting the findings. First, using a large sample, this study may increase the potential of generalization than previous research using a small or at-risk children sample; however, the sample of the present study consisted of mostly European American and middle-class parents. Further, participants were recruited from SUTQ rated programs in Ohio. Therefore, results from this study may still not generalize to other population and other geographic areas.

Second, it is difficult to clarify the effectiveness of predictors at a single point time because children in early childhood are in the progress of rapid development. Rutter and Pickles (1991) suggested that longitudinal studies provide better understanding of changes over time in

relations between contexts and children's development. Especially, the impact of SUTQ level can be varied with the time a child enrolled in the program. To find longer term contributions of star levels, pre-test and post-test are needed on particular child outcomes participating in QRIS programs (Zellman et al., 2008). Longitudinal study will help understand change in children's development over time in light of the level of QRIS.

A final limitation of the study is the use of parents' self-reported responses to measure household chaos and child outcomes. The tendency for respondents to provide socially desirable answers is always a concern when obtaining data through surveys and questionnaires (Bracken & Fischel, 2008). Because parents had to respond about their child's abilities, they may have over-reported scores. In addition, Corapci and Wachs (2002) suggested that household can be more accurately assessed through direct observation. Thus, direct assessment to measure children's cognitive and social development and direct observation in the home will be helpful to reduce this bias.

While weaknesses exist, there are notable strengths in this study that make it an important contribution to the literature. It is well known that the home and preschool environment plays a significant role in children's development. However, there was a lack of research related to preschool children's social competence in terms of home chaos and SUTQ. Investigating the effects of home chaos on social competence, this study found that a chaotic home environment uniquely predicted social competence. Additionally, this research suggests that QRIS is a potentially important area for further exploration.

Future Directions

The results of this study suggest several possible directions for future research and practice. This study found that chaotic home environment affects limited social skills, however,

the process of this deficit is not clear in this study. Several researchers argued that children's social competence comes from their language development because it may enhance communication skills (Foster et al., 2005). This study assumed that it may be due to a lack of social detection or children's attentional deficit. Further research is needed to establish this process.

The evaluation of QRIS in terms of child outcomes should be continuously examined to increase the power of the new policy. Specifically, longitudinal studies will be useful to find changes in child development over time in the quality level. This study found a few associations between the SUTQ and social competence. This is more than previous studies which presented no significant association between QRIS and child outcomes (Zellman et al., 2008). Zellman et al. (2008) suggested that building a QRIS will take time and should be conducted incrementally. Further, each indicator should be clearly articulated, designed, tested, and validated to reach the ultimate purpose of QRIS, enhancing children's outcomes and school readiness (Zellman & Perlman, 2008). Additionally, the evaluation of QRIS in other states is needed to compare the effects of QRIS in each state.

This study expected the interactions between the home and preschool. Even though there was no moderating effect of SUTQ, more various predictors in the home which can interact with QRIS should be tested in future. It will increase benefit of QRIS because if QRIS can moderate the negative effects of home environment, the investment made by state and federal policymakers may increase.

In practice, this study suggests the need for intervention and prevention programs which can enhance preschool children's school readiness. Confused and disorganized home environments may have detrimental effects on child development and school readiness. This may

imply treatment or prevention programs for parents to encourage organization, regularities, routines, and predictability in the home.

Preschool programs that can facilitate children's development can be viewed as an investment (Barnett, 1985). There has been continuous evidence that investing in early childhood education and childcare finally had economical benefit (Nores, Belfield, Barnett, & Schweinhart, 2005). There is not enough research which can support the effectiveness of QRIS because this policy is still in its infancy. However, this study found the possibilities of the important role of QRIS in Ohio, guiding policymakers, early childhood educators, researchers and parents. Federal and state policymakers may be able to expect positive return on the current QRISs investment, which in turn, may provide impetus for more robust systems.

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Table 1.

Sample Characteristics

Children (N=4344)			
Gender	Male 47.6% Female 52.4%	Race/ Ethnicity	White 72% African American 20.8% American Indian/Alaskan Native 0.9% Asian American 3% Native Hawaiian or Pacific Islander 0.3% Other 3%
Age (months)	Mean = 54.11 Range = 40-68 SD = .68		
Primary Caregivers (N=4344)			
Relationship with a child	Mother 89.9% Father 6.2% Grandparent 1.6% Other 2.3%	Race/ Ethnicity	White 77 % African American 17.8% American Indian/Alaskan Native 0.9% Asian American 2.1% Native Hawaiian or Pacific Islander 0.3% Other 1.9%
Age (years)	Mean = 34 Range = 20-65 SD = 7		
Education Status	Less than high school/no GED 4.5% High school diploma or GED 17.2% Some college, but no degree 22.7% Associate of arts (A.A.) degree 8.1% Bachelors degree (B.A. or B.S.) 25.4% Graduate degree (M.A. or M.S.) 12.5% Graduate degree beyond a master (Ph.D or Ed.D) 2.6% Other 7%		
Marital Status	A spouse/partner living in the home with children 71.9% Married 62.8% Cohabiting 6.3% Separated 0.3% Divorced 0.1% Other 2.5% A spouse/partner not living in the home with children 26%	Family income	Less than \$10,000 11.7% \$10,000 - \$15,000 6.9% \$15,001 - \$20,000 6.6% \$20,001 - \$30,000 9.9% \$30,001 - \$40,000 7.5% \$40,001 - \$50,000 5.6% \$50,001 - \$60,000 5.9% \$60,001 - \$70,000 5.5% \$70,001 - \$80,000 6.1% \$80,001 - \$90,000 5.3% More than \$90,000 25%
Employment Status	Work with traditional work hours 47.6% Not work with traditional work hours 52.4%		

Table 2.

Hierarchical Regression of Child Social Competence on Household Chaos

Predictor	Peer Relationships		Respect		Conformance to classroom norms		Learning Approach	
	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.02**		.04**		.05**		.06**	
Control variables								
Child age		.06**		.12**		.11**		.14**
Child gender		-.10**		-.09**		-.10**		-.10**
Family income		.06**		.07**		.11**		.03**
Maternal education		-.01		.03		.03		.03
Step 2	.02**		.06**		.06**		.03**	
Household chaos		-.16**		-.25**		-.25**		-.18**
Total R^2	.04**		.10**		.11**		.09**	

Note. Standardized regression coefficients (β) are presented for the final model after all predictor variables have been entered.

** $p < .01$; * $p < .05$

Table 3.

Hierarchical Regression of Child Social Competence on SUTQ Level

Predictor	Peer Relationships		Respect		Conformance to classroom norms		Learning Approach	
	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step1	.02**		.04**		.05**		.06**	
Control variables								
Child age		.05**		.11**		.10**		.13**
Child gender		-.10**		-.10**		-.11**		-.11**
Family income		.08**		.10**		.14**		.16**
Maternal education		.01		.06**		.05**		.05**
Step 2	.00		.001*		.001*		.00	
SUTQ level		.01		.03*		.03*		.01
Total R^2	.02**		.04**		.05**		.06**	

Note. Standardized regression coefficients (β) are presented for the final model after all predictor variables have been entered.

** $p < .01$; * $p < .05$