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RESEARCH ARTICLE

Associations of Adversity to Indicators of Child Well Being in a High Quality Early Education Context

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Studies have shown that adversity in childhood has harmful effects on well-being across the lifespan. This study examined the prevalence of children's cumulative experiences of adversity, based on parent report, in a national sample of low-income children (N=3,208) enrolled in a high quality early childhood education (ece) program. It explored the association between family adversity that occurred within the year prior to the parents' interview and the child's well-being measured after the interview. Well-being was based on language, school readiness, and social emotional outcomes. Almost half of all families reported experiencing at least one adversity. Family adversity was associated with worse school readiness and health outcomes. Adversity had mixed associations with social-emotional outcomes and no association with language outcomes. This study also explored time enrolled in ece (dosage) as a protective or promotive factor in relation to adversity. Time in program had a positive relationship to most child outcomes and could be interpreted as a promotive factor within the context of adversity for all outcomes except behavioral concerns.

Keywords: adverse childhood experiences (ACEs); early education dosage; achievement gap

The cumulative risk model is frequently used to explain how poverty negatively impacts the development of young children (Aber, 2012; Evans, Li, & Whipple, 2013). Multiple studies have pointed to the negative impact of cumulative risk, as measured by a variety of family

dysfunction indicators, risky family demographics, and economic hardship variables on children's outcomes (e.g., Burchinal, Roberts, Zeisel, Hennon, & Hooper, 2006; Sameroff & Seifer, 1983; Stanton-Chapman, Chapman, Kaiser, & Hancock, 2004; Yumoto, Jacobson, & Jacobson, 2008). In cumulative risk studies, these factors are combined to create a continuous scale of accumulated risk for the purpose of examining the additive effects of those risks (Appleyard, Egeland, VanDulmen, Sroufe, 2005; Ayoub et al, 2009; Dube et al., 2003; Evans & Kim, 2013; Raikes, Vogel, & Love, 2013). While these studies often combine *demographic risk*, such as socioeconomic status or family structure, with *experiential risk*, such as family instability and family conflict, it is also important to examine experience disaggregated from demographics in order to understand how different domains of risk impact children, how various risks cluster together within samples, and ways in which risk creates ongoing vulnerability (Evans, Li, & Whipple, 2013; Masten & Monn, 2015).

Adverse childhood experiences (i.e., ACES), defined herein as an event or series of events that threaten children's physical, emotional, or psychological health and safety, have been documented to be associated with multiple negative short- and long-term outcomes (i.e. Appleyard et al., 2006; Evans, 2004; Felitti et al., 1998; Mistry, Benner, Biesanz, Clark, & Howes, 2010). Early experiences of adversity can disrupt brain architecture, compromise physiological and psychological responses to future stressors, limit cognitive development, and increase lifelong vulnerability to stress-related illnesses (Felitti et al., 1998; Shonkoff & Garner, 2012). There is evidence that the experience of adversity during early childhood, versus later in life, has detrimental and pernicious effects on children's outcomes (Shonkoff & Garner, 2012). Further, the higher prevalence of these experiences in low-income sub-populations is a matter of social justice, as these experiences are associated with reduced human flourishing. Thus, early childhood scholars have called for more investigation into the effects of adversity on young children's outcomes across domains of child development, with an emphasis on children living in poverty.

Another compelling empirical and policy/practice question pertains to identifying factors or experiences during the early childhood period that may buffer children against the negative effects of such adversity or promote positive outcomes even in the context of adversity. One factor that merits further examination is participation in high quality early childhood programs, which has been found to bolster children's school readiness (Camilli, Vargas, Ryan, & Barnett, 2010; Weiland & Yoshikawa, 2013) and to have long-term impacts on participants well-being as adults (Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2008; Schweinhart et al., 2005). One line of research in early childhood has examined dosage, defined as the amount or timing of either current or cumulative participation in early education programming. This research has generally suggested that more time in high-quality early education programs is beneficial for children's developmental outcomes (Zaslow, et al., 2010). However, very little is known about the associations between ece dosage and outcomes among children who have experienced early adversity.

Adversity in the Context of Poverty

Adversity in the lives of young children can take many forms, including traumatic events, and deprivation of needed human interaction, protection, or access to basic resources. A review of literature from the U.S. and the United Kingdom shows that children living in poverty experience

a myriad of adversities, such as family instability, harsh parenting, unsafe neighborhoods, health problems, corporal punishment, substandard housing and high mobility (Evans & Kim, 2013). Poverty-related risks seem to have a particularly harsh impact on children during early childhood. Experiencing severe poverty (i.e., families with incomes less than 50% of the U.S. federal poverty level [FPL]) in early childhood is associated with a broad range of developmental problems in the physical-biological, cognitive-academic and social-emotional domains (Duncan & Brooks-Gunn, 1997; Yoshikawa, Aber, & Beardslee, 2012). Further, low-income children are less likely than middle –income children to experience enriching activities, healthy limitations of screen time, and high quality early care environments (Evans & Kim, 2013; Ruzek, Burchinal, Farkas, & Duncan, 2014).

Overall, the context of poverty is linked to various types of additional adversities that negatively affect the health and well-being of families and the learning and development of children. Risk factors such as mental illness, substance abuse, interpersonal/community violence, and material hardship often characterize the experiences of many children from impoverished backgrounds (Ackerman, Brown, & Izard, 2004; Evans, 2004). Research supports the possibility that these types of risk factors may act as mechanisms through which poverty affects young children, and may more directly influence child outcomes than poverty itself (Gassman-Pines & Yoshikawa, 2006; Jones-Harden, Monahan, & Yoches, 2012).

Burgeoning evidence documents the negative impact of early adversity on brain development and autonomic stress (ANS) response systems (Johnson, Riley, Granger, & Riis, 2013). Executive functions of working memory, attention shifting, and inhibitory control are impaired by current and ongoing stress (Diamond, 2013). Persistent stress in the absence of a warm and responsive caregiver is related to changes in the architecture of the brain (Shonkoff & Garner, 2012). The rapidly developing brain of young children is particularly sensitive to these stressors (Johnson et al., 2013). Recent advances in our understanding of the brain support past research on the sensitivity of children's development in the context of poverty and other adversities (Brooks-Gunn & Duncan, 1997).

These more current studies were foreshadowed by work in the late 1990s, which added much to our understanding of adversity and resilience. In 1998, the adverse childhood experiences (ACEs) study broke ground in preventive health by linking long-term health outcomes to traumatic or stressful experiences during childhood, that is, experiencing parental divorce, having a parent with a mental illness, having a parent with a drug or alcohol problem, witnessing domestic violence, having a household member who was incarcerated, or experiencing physical, psychological, or sexual abuse, or neglect (Felitti et al., 1998). The number of these experiences in childhood, summarized as an ACE score, showed a graded relationship with adulthood risky health behaviors, chronic health problems, and premature mortality (Felitti et al., 1998, Dube, et. al, 2003). This study borrows from the family dysfunction questions of the ACEs study, but does not include abuse nor neglect.

Benefits of High Quality Early Childhood Programs

Exposure to high-quality early education experiences may be beneficial for children, and may be an important step toward achieving social justice for children and families living in poverty (Irvine, 2010). Risk can be attenuated through protective and or promotive processes at the individual or familial level. *Protective processes* buffer individuals from risk, so that the

protective process is particularly good for individuals at risk. *Promotive processes*, however, tend to be good for all individuals regardless of risk, but may compensate for problems associated with an individual's experience of adversity (Henry, Sheffield Morris, & Harrist, 2015; Masten & Monn, 2015).

To a very limited extent, high-quality early care and education programs have been explored as one ecological context or intervention that may protect children from the effects of family and other environmental risk factors. In a study examining children's home and child care environments, children experiencing poor home environments, as well as low-quality child care environments, were found to have particularly poor social-emotional outcomes (Watamura, Phillips, Morrissey, McCartney, & Bub, 2011). However, the authors also found that high quality child care compensated to some degree for children's poor home environments. In a study focused on cumulative risk (Burchinal et al., 2006), children experiencing multiple risks had poorer outcomes, which were mediated by the parenting they received. Child care quality, however, was a protective factor with respect to these children's mathematics skills and behavior problems during elementary school.

High quality early childhood programs, by definition, are characterized by factors that build resilience, such as children's experience of warm, responsive and stimulating relationships with teachers and caregivers. There is a paucity of evidence regarding the benefits of early care and education programs for young children who experience severe adversity. Early Head Start (EHS) studies document worse outcomes for children with multiple family risks, but show that enrolling in both EHS and Head Start (HS) provided additional benefits (Ayoub et al., 2009; Raikes et al., 2013). This study builds on that finding by exploring more experiential risk, rather than demographic risk, within a context of exposure to quality early education and care. Previous research findings have suggested that children's developmental outcomes are better when they enter care early and stay for a longer duration (Yazejian, Bryant, Freel, Burchinal, & the Educare Learning Network (ELN) Investigative Team, 2015; Zaslow et al., 2010). Although we did not find studies examining the association among early education dosage and adversity, research generally supports the notion that greater exposure to high-quality care is related to higher levels of school readiness skills among low-income children (Lee, Zhai, Brooks-Gunn, Han, & Waldfogel, 2014; Wen, Leow, Hahs-Vaughn, Korfmacher, & Marcus, 2012).

The findings from these few studies call for more research which examines the influence of experiencing multiple adversities on the developmental outcomes of young children who experience participation in high quality early care and education programs. To address this gap in the literature, the current study examined the prevalence of multiple adversities, the relationship of these adversities to child outcomes, and whether the relationship between adversity and outcomes was different for children with different levels of exposure to high quality programs.

The Current Study

Given the breadth of the cumulative risk literature and its connection to child outcomes, studies that explore the influence of specific domains of risk may clarify the types of intervention needed for children and families. Understanding how family experiential risk relates to child outcomes, but controlling for demographic risk, can provide unique information about children and families experiencing more severe adversity within the ongoing adversity of living in

poverty. Additionally, due to the importance of examining factors that can protect against early adversity or promote positive outcomes within adversity, the current study fills a gap in the literature by examining the protective or promotive influence of participation in high quality early care and education with a wide range of young children.. This study capitalizes on a large sample of children living in poverty and explores subgroups of those experiencing different levels of adversity within the context of poverty and different doses of high quality early care and education.

Adversity is defined as an event or series of events that threatens children's physical, emotional, or psychological health and safety and has been documented to be associated with multiple negative short- and long-term outcomes for children. Specifically, the adversities examined in the current study were food insecurity, housing insecurity, caregiver depression, family incarceration, family drug or alcohol problem, child witnessing interpersonal violence, and a family member being the victim of community violence. This study borrowed from the family dysfunction items used in the ACE study, as well as including severe economic hardship experiences. Beyond the ACE study, these types of risk factors are frequently studied within cumulative risk literature to understand the relationship between adversity and variations in children's outcomes. This study approaches the cumulative risk model uniquely, separating out demographic risk, and testing its association with child outcomes.

Because of interest in the effects of participation in early care and education on children's outcomes, this study also examines whether the dosage of high quality early education that children receive through ongoing enrollment interacts with adversity to better predict child outcomes. The amount of time, measured in years, children have been enrolled is referred to as *dosage*. Previous examination of this dataset has documented that, after controlling for a number of family factors that might be associated with both earlier enrollment and children's outcomes, the longer children remain in the Educare program, the better they fare over time (Yazejian et al., 2015).

While dosage has been found to be important within this dataset, the focus of this study are the association between adversity and children's outcomes. This study's secondary aim is to expand the limited research that documents potential protective or promotive effects of high-quality early care and education on the outcomes of young children experiencing adversity. This investigation will address the following 3 research questions:

1. What is the prevalence of adversity in a national sample of low-income children enrolled in a high quality early childhood program?
2. Is cumulative adversity associated with poorer social-emotional, language, and school readiness outcomes for low-income children?
3. Does length of time in a high quality early childhood program moderate the association between adversity and child outcomes?

METHOD

Participants

The sample includes a total of 3,208 children enrolled in Educare, a high quality early education program, during the 2012-13 and 2013-14 school years. The parents of more than 90% of enrolled children consented for their children's data to be included in the implementation study

database from which these data were extracted. Children were enrolled in Educare for 1.55 years (SD=1.08), on average. The amount of time children had been enrolled on the day of their last assessment used for this study varied. Specifically, 46.9% of children had been enrolled less than a year, 30.2% had been enrolled 1-2 years, 11.9% had been enrolled 2-3 years, and 11% had been enrolled 3 or more years. The average age of children at program entry was 2.35 (SD=1.41) years. Ages of the children at the last assessment used for this analysis varied from less than 1 year old (2.7%), 1-2 years old (8.5%), 2-3 years old (13.8%), 3-4 years old (20.3%) and 4 or more years old (54.7%). Data for this study are from 18 early care and education schools, located in 15 U.S. cities including Phoenix, AZ, Denver, CO, Washington, D.C., Miami, FL, Atlanta, GA, Chicago, IL, Kansas City, KS, New Orleans, LA, Waterville, ME, Lincoln, NE, Omaha, NE, Oklahoma City, OK, Tulsa, OK, Seattle, WA, and Milwaukee, WI.

Demographic characteristics reflected the types of families in U.S. cities who qualify for EHS/HS (i.e., family income below the FPL). About half of the sample were boys (52%). The sample was comprised primarily of children of color (42% black, 39% Hispanic). Another 11% of children were white, and 8% other races; dual language learners comprised 31% of the sample, with the majority (27.9%) having Spanish as a home language. Most children were reported by their parents to be in very good to excellent health (average score of 4.26, SD=.83 on a scale of 1-5, where 1 = poor and 5 = excellent). Ten percent of the children had an Individualized Education Program (IEP) or Individualized Family Service Plan (IFSP) indicating receipt of special education services. Nearly half of the families were headed by single parents (49%). Primary caregivers' (mothers in more than 90% of the cases) mean age was 25.71 (SD=6.15) years old at the birth of their child. Primary caregivers had an average of 12.41 (SD=2.13) years of education.

Procedures

This study includes data from the 2012-2013 and 2013-2014 academic years. Families were recruited into the study following enrollment into the early childhood program. Following enrollment, parent interviews were collected annually and asked about the last year of the family's life. Child outcomes were assessed on a schedule according to the child's age. Details of the schedule are outlined along with measure information.

The most recent child outcome was used across multiple ages. For each child in this sample, the parent interview used for analysis must have occurred prior to the child outcome used for analysis. The parent interviews included questions from which the adversity score was calculated per child. Standard procedures for protecting human research subjects were followed, including protection of confidentiality, informed consent, and training of key study personnel in the rights of human research subjects.

Measures

Parent Measures. The Parent Interview provided an array of information on family characteristics and self-report of experiences within the last year. Characteristics included the mother's age at the time the child was born, the primary caregiver's highest level of education, and the structure of the family. Family characteristics were used as control variables. Family

experiences were used to calculate the main independent variable – adversity. There was an average of 5.08 (2.58) months between the parent interview and child assessments, with the parent interview always preceding the child assessment. Interviews were completed with families by the early education programs' family support staff who generally had established relationship with the families.

Adversity. Through the Parent Interview, families were asked about a series of events in a section of the interview labeled "What Happened Last Year" (Educare Learning Network, 2007). Examples of items included "In the last year… Did your child live with someone who had a drug or alcohol problem?" Parents answered 'yes' or 'no' to these questions to identify family adversities of living with someone with a substance abuse problem, having a family member incarcerated, having a family member who was the victim of a violent crime, and the child witnessing domestic violence. These questions were chosen based on their similarity to the family dysfunction items of the ACE study questionnaire. Other questions asked whether the family had been homeless in the last year, to which they could answer 'yes' or 'no'. They were also asked how often they had run out of food. If they answered "sometimes" or "often", this risk was counted as a 'yes'. A tool reported as being reliable in identifying depression was used to identify families with depressive symptoms (Andrews, 1995). Answering 'yes' to 2 of the 3 questions on the tool is interpreted as a positive screen for depression. Each risk was dichotomized into yes-risk experienced equaled 1 and no-risk not experienced equaled 0 and summed into the adversity scale. These variables produced a cumulative account of *adversity*, based on parent report. The adversity score was calculated for any child with non-missing data on at least one risk experience variable, in order to use as many cases as possible for analysis. The range of the adversity scale was from 0 to 7.

As this scale is a sum of various negative experiences, rather than a number of items intended to measure a single construct, internal reliability is not appropriate to calculate. However, point biserial correlations are often used to indicate how well certain items discriminate for a specific score. This can be used for this score, as all items are dichotomous. This correlation is shown in Table 1, where it is indicated that all items discriminate fairly equally for the overall adversity score. Additionally, the cumulative method is appropriate to use when items correlate with one another. Table 1 also shows that the risk variables correlate with one another, therefore summing them reduces multicollinearity in the predictive model.

TABLE 1.
Summary of Correlations, Frequencies, and Prevalence of Individual Adversities

	Measure	1	2	3	4	5	6	7	8
1	Overall Adversity Score	-							
2	Parent screened positive for depression	.57**	-						
3	Ran out of food	.52**	.19**	-					
4	Lived with someone with drug or alcohol problem	.44**	.09**	.03	-				
5	Witnessed domestic violence	.53**	.13**	.07**	.37**	-			
6	Family member incarcerated	.58**	.13**	.07**	.21**	.21**	-		
7	Family member victim of violent crime	.50**	.14**	.03	.18**	.30**	.27**	-	
8	Homeless in the last year	.45**	.15**	.11**	.06**	.16**	.15**	.14**	-
	N	3208	3208	3208	3159	3150	3174	3172	3180
	Percentage		18%	23%	5%	6%	16%	7%	7%

Note: *$p < .01$, **$p < .001$; N = number of responding parents; Percentage = percentage of responding parents who experienced this adversity.

Child Measures. Each child enrolled in the program could be assessed on a number of measures. All enrolled children were eligible for a teacher-completed rating of behavior designed to understand social-emotional protective factors of children. Children who were turning 2 years old were eligible for an auditory language scale. Three year old children were eligible for an auditory language and receptive vocabulary test. They were then given these two assessments in the Fall of their first Head Start year and each Spring thereafter. Finally, in the Spring before their kindergarten year, children were assessed with the Bracken School Readiness Assessment.

Social emotional development. The Devereaux Early Childhood Assessment (DECA) is a group of rating tools that were used to assess children's social emotional development. In academic year 2012-2013, the DECA for Infants and Toddlers (DECA-I/T: Mackrain, LeBuffe,

& Powell, 2007) and the DECA (LeBuffe & Naglieri, 1999) were used. In academic year 2013-14, the DECA-P2 (LeBuffe & Naglieri, 2012) was used in place of the DECA for preschool-age children. The Infant form includes Initiative and Attachment subscales. A Self-Regulation subscale is added in the Toddler and Preschool versions, and an additional screener examines Behavior Concerns in the Preschool version only. The technical manual for the measure reports that internal consistency estimates for teacher raters on these subscales ranged from .87 to .94 for the infant and toddler forms, .80 to .90 for the DECA preschool form, and from .85 to .94 for the DECA-P2 preschool form. Typical ranges for T-scores on each subscale are between 41-59, while scores of 40 and below represent areas of need for Initiative, Attachment, and Self-Regulation. Scores above 60 indicate a need for Behavior Concerns, but a strength for Initiative, Attachment, and Self-Regulation.

Language development. Language development was examined using two direct assessment tools – the Peabody Picture Vocabulary Test – version 4 (PPVT-4; Dunn & Dunn, 2007) and the Preschool Language Scale—Fifth Edition (PLS-5; Zimmerman, Steiner, & Pond, 2011). The PPVT-4 is a test of receptive vocabulary, which can be used with individuals from ages 2.5 to 90 years. Children are shown a series of four pictures and asked to identify the picture that reflects the provided vocabulary word. As reported by the publishers of the measure, split-half reliability within the two forms ranged from .89 to .97. Test-retest reliability ranged from .91 to .94. The PPVT was used in this study with children 3 to 5 years old. It produces a standard score with a mean of 100 and a standard deviation of 15.

The second tool, the PLS-5, is a structured play-based assessment designed for children from birth to seven years of age. It is used to evaluate children's receptive and expressive language skills, as well as their understanding and use of grammatical rules. The PLS-5 has two subscales: Auditory Comprehension (AC) and Expressive Communication (EC), and is available in English and Spanish. Only the Auditory Comprehension sub-scale was examined for the current study. The standardization sample included 1,400 children from 45 states in the United States, matched with the Census child population. Split half reliabilities range from .80 to .97. Test developers report that sensitivity for the Total Language score is .83, and specificity is .80 (Zimmerman et al., 2011).

School readiness. The Bracken School Readiness Assessment – version 3 was used to directly assess children's familiarity with academic concepts (Bracken, 2007). It measures familiarity with academic concepts, with subscales of colors, letters, numbers and counting, sizes and comparisons, and shapes. The subscales are combined to form a school readiness composite score, which is standardized for children 3 years to 6 years and 11 months. Test-retest reliability was estimated using the Pearson's product-moment correlation. The average corrected stability coefficient ranged from .76 to .92 (Bracken, 2007). The standard score has a mean of 100 and a standard deviation of 15.

Child health. Two measures of children's health were examined based on parent report, both derived from the parent interview – an overall health rating and a health problems summary score. The overall health rating was reported on a scale from 1-5, with 1 being poor and 5 being excellent. Parents were also asked to report whether their child experienced the following specific health problems: allergies, diabetes, sickle cell disease, high lead levels, anemia, eczema, hearing difficulties, asthma, obesity, vision problems, or any other health problems. The health problems summary score was calculated as the sum of all health problems reported. In the analysis models, both the overall health rating and health problems score were standardized with a mean of 0 and standard deviation of 1.

Dosage. Dosage was measured as length of time in care. Time in care was calculated for each assessment as the difference between the child's age at assessment and their age of entry divided by 365.25, providing a measure of the time in years children had attended the program. Mean time between enrollment and the interview was 12.39 (12.7) months, with enrollment always preceding the interview. The varying amounts of time between enrollment and assessment of outcome measures created a variable that roughly defined the amount of exposure children had to the classroom and also defined the amount of time families had access to program supports.

RESULTS

Descriptive analyses examined the distribution of individual adversities, demographic characteristics, and child outcome variables within the sample, as well as correlations between adversity and child outcomes. Inferential analyses examined associations between time in Educare and child outcomes using two-level hierarchical linear models with children nested in classrooms. A large set of covariates was included to produce conservative estimates of associations – site, child age, gender, race, primary language, family structure, education level of the primary caregiver, whether the child had an IFSP/IEP, and age of the child's mother when the child was born. It should be noted that demographics often used in cumulative risk models are controlled for within this model. Specifically, variables such as family structure, education level of the primary caregiver, and age of the child's mother can also identify risks such as single parent, no high school education, and teen parent.

Models using assessments with multiple versions controlled for test version (DECA), and the model using assessments with multiple languages controlled for test language (PLS-5). The adversity scale score and the interaction between adversity and dosage were included in the models to examine relationships between child outcomes and adversity and whether this relationship differed by time in Educare. All analyses were conducted with SAS 9.3.

There was diversity within the number and types of adversities experienced by the sample. Table 1 lists the prevalence of individual adversities experienced as well as correlations between the adversities. Bivariate correlations between the adversities confirmed the appropriateness of the cumulative approach to combining the adversities into a single scale. The cumulative approach is appropriate when risk variables correlate with one another. Combining risks reduces problems of multi-collinearity in regression analyses while also providing information about the additive relationship of risk to the outcomes of interest. Most adversities correlated with one another, with the exception of running out of food with two variables – having a family member who was a victim of a violent crime and living with someone with a drug or alcohol problem. Frequencies of the variables showed that running out of food was the highest reported adversity (23%) and living with someone with a drug or alcohol problem was the least reported adversity (5%). The distribution of cumulative adversity scores in the sample is presented in Table 2. Almost half of all children in the sample (48.25%) experienced at least one adversity within the year preceding their parent interview.

TABLE 2.
Prevalence of Cumulative Adversity

Number of Adversities	0	1	2	3	4	5	6	7
Percentage of Sample	51.75	27.40	13.44	4.05	1.84	1.00	.53	0

N=3,208

Child outcome distributions are shown in Table 3. Means of the PLS-5 and the DECA resembled national norm means and standard deviations. The PPVT and Bracken scores were below national norms by approximately half a standard deviation. Correlations between child outcomes and the predictors of interest - adversity and time in Educare - are also presented in Table 3.

TABLE 3.
Child Outcomes

	Descriptive statistics			Correlations	
	N	*Mean*	*SD*	*Adversity*	*Dosage*
DECA Initiative	3072	52.30	9.54	-.04*	.07***
DECA Attachment	3072	51.14	9.42	-.06**	.04*
DECA Self-Regulation	2837	50.71	10.28	-.08***	.00
DECA Behavioral Concerns	2242	50.29	10.42	.11***	.01
PPVT	2133	92.94	15.32	-.01	.13***
PLS-5 Auditory Comprehension	1994	97.49	13.83	-.06*	.13***
Bracken	1521	92.51	14.93	-.08**	.16***
Health rating	3191	4.26	.83	-.08**	.04*
Sum of health problems	3208	.48	.80	.13**	.02

Note: +.05<p<.1, *.01<p<.05, **.001<p<.01, ***p<.001

Regression results are presented in Tables 4-6. Due to the correlational nature of this study, and the large sample size, models are interpreted more conservatively, at the p>.01 level. That is, alpha levels were set lower in order to reduce the likelihood of Type I error. In the hierarchical linear models controlling for site and demographic characteristics, both adversity and time in Educare were predictive of social-emotional outcomes. Higher adversity scale scores were associated with higher scores on the DECA Behavioral Concerns (B=.81, SD=.18) subscale, and with lower scores on Initiative (B=-.37, SD=.14) and Self-Regulation (B=-.62, SD=.17) subscales. More time in Educare was associated with higher DECA Initiative (B=.53, SE=.17), but also higher DECA Behavioral Concerns (B=.56, SE=.19) scores. Interactions between adversity and dosage were not significant in the DECA models.

Adversity and dosage were associated with school readiness scores, but not language scores. School readiness scores were lower for those experiencing more adversities (BRSA: B=1.40, SD=.36). There was not a statistically significant relationship between adversity and the two language variables – auditory comprehension or receptive vocabulary. Receptive vocabulary, auditory comprehension, and school readiness assessment scores were higher for those with more time in Educare (PPVT: B=1.90, SD=.26; PLS-5: B=1.42, SD=.27; Bracken: B=1.38, SD=.30). Again, there were no significant interactions between dosage and adversity.

Children's health rating and number of health problems were associated with adversity, but not with dosage. Higher adversity scale scores predicted worse parent-reported health (B=-08, SD=.02) and more health problems (B=.11, SD=.02). There were no significant relationships to dosage, nor significant interactions between adversity and dosage.

TABLE 4.
Fixed and Random Effects for Predictors of DECA subscales

	Attachment N=2958	Initiative N=2958	Self-Regulation N=2736	Behavior Concerns N=2155
		Fixed effects		
Intercept	51.56 (0.33)	52.73 (.30)	50.90 (0.30)	50.15 (0.36)
Adversity	-.33 (.14)	-.37* (.14)	-.62** (.17)	.81** (.18)
Dosage	.41 (.16)	.53* (.17)	-.39 (.19)	.56* (.19)
Adversity*Dosage	.09 (.14)	-.05 (.14)	.16 (.16)	.03 (.17)
Site	F=1.75*	F=1.42	F=1.08	F=2.69***
Age (months)	.04 (.02)	.16** (.02)	.18** (.02)	-.17** (.03)
Male	-2.32** (.29)	-2.68** (.30)	-3.19** (.35)	4.03** (.38)
DLL	-.62 (.47)	.08 (.49)	1.73** (.57)	-1.26* (.63)
Black	-.05 (.64)	-.35 (.66)	-.58 (.78)	1.14 (.91)
Hispanic	.64 (.67)	.46 (.69)	1.58+ (.81)	-1.17 (.91)
Other race	.32 (.73)	1.42+ (.75)	1.75* (.89)	-1.05 (1.01)
Single parent	-.26 (.31)	-.27 (.32)	-1.08* (.37)	1.62** (.41)
IEP/IFSP	-2.61** (.51)	-4.05** (.53)	-3.73** (.60)	3.12** (.65)
Parent education	.04 (.08)	.09 (.08)	-.04 (.09)	.06 (.10)
Mother's age at birth	-.01 (.02)	.02 (.03)	.06+ (.03)	-.07 (.03)
		Random effect variances		
Intercept	27.63**	20.46**	16.42**	18.45**
Level 1 Residual	55.41**	60.18**	76.18**	72.60**

Note. Standard errors are in parentheses. DLL = dual language learner; IEP/IFSP = Individualized Education Plan or Individual Family Support Plan
*p < .01, **p < .001

TABLE 5.
Fixed and Random Effects for Predictors of Language and School Readiness

	PPVT Receptive Vocabulary N=2048	PLS5 Auditory Comprehension N=1932	Bracken School Readiness N=1444
		Fixed effects	
Intercept	92.99 (.28)	98.07 (.36)	93.44 (.46)
Adversity	-.41 (.27)	-.65 (.28)	-1.10* (.34)
Dosage	1.90** (.26)	1.42** (.27)	1.38** (.30)
Adversity*Dosage	-.40+ (.24)	-.22 (.25)	-.01 (.29)
Site	F=7.30**	F=9.77**	F=6.78**
Age (months)	.07 (.03)	-.03 (.03)	-.07 (.05)
Male	-2.10** (.56)	-3.80** (.58)	-2.89** (.69)
DLL	-8.28** (.89)	-2.60* (1.26)	-2.22 (1.10)
Black	-2.63 (1.30)	-3.73* (1.36)	-.46 (1.60)
Hispanic	-4.94** (1.29)	-3.61 (1.44)	-3.42 (1.58)
Other race	.08 (1.45)	-.34 (1.52)	3.21+ (1.78)
Single parent	-.47 (.60)	.40 (.61)	-.45 (.74)
IEP	-6.81** (.96)	-8.75** (1.06)	-5.10** (1.19)
Parent education	1.29** (.15)	.52* (.15)	1.13** (.18)
Mother's age at birth	.09+ (.05)	.04 (.05)	.14* (.06)
		Random effects variances	
Intercept	0.02	0	3.72+
Level 1 Residual	155.83**	158.20**	161.48**

Note. Standard errors are in parentheses. DLL = dual language learner; IEP/IFSP = Individualized Education Plan or Individual Family Support Plan
*$p < .01$, **$p < .001$

TABLE 6.
Fixed and Random Effects for Predictors of standardized Health Rating and Health Problems

	Health Rating N=3069	Health Problems N=3085
	Fixed effects	
Intercept	.07 (.02)	-.09 (.02)
Adversity	-.08** (.02)	.11** (.02)
Dosage	.03+ (.02)	.02 (.02)
Adversity*Dosage	-.01 (.02)	.03 (.02)
Site	F=2.85**	F=5.55**
Age (months)	-.01 (.01)	.01 (.01)
Male	-.09 (.04)	.16** (.03)
DLL	-.07 (.06)	-.24** (.06)
Black	-.17 (.08)	.12 (.08)
Hispanic	-.32** (.08)	-.12 (.08)
Other race	-.26* (.09)	.08 (.09)
Single parent	-.03 (.04)	.10* (.04)
IEP	-.21* (.06)	.42** (.06)
Parent education	-.00 (.01)	.02* (.01)
Mother's age at birth	-.00 (.00)	-.00 (.00)
	Random effect variances	
Intercept	0	0
Level 1 Residual	.95**	.89**

Note. Standard errors are in parentheses. DLL = dual language learner; IEP/IFSP = Individualized Education Plan or Individual Family Support Plan
*$p < .01$, **$p < .001$

DISCUSSION

Based on parent report, almost half (48.25%) of this sample of children had experienced family adversity at a very young age. Before children's entry to kindergarten, these parents report that the family had run out of food, been homeless, or struggled with depression, community violence, drug or alcohol addiction, incarceration, or intimate partner violence. This provides a unique addition to the cumulative risk literature, with a focus on adverse experiential risk at the family level, controlling for other demographic risks. The frequency of these adversities within a large, national sample clarifies that these occurrences are not rare. Adversity is part of the story of children enrolled in early childhood programs serving low-income families, making the experience of poverty even harder.

Data from the National Survey of Children's Health provide information on the prevalence of these factors for children birth to age 17. Similarly to this study, the most commonly reported adversity is economic hardship (Sacks, Murphy, & Moore, 2014). Out of children birth to 5 years of age, 25% experienced economic hardship, 6% lived with someone with drug problems, 6% lived with someone who was mentally ill, 3% were victims or witness to violence in their community, 4% witnessed domestic violence, and 5% lived with a parent who

had been incarcerated (Sacks et al., 2014). Another nationally representative study estimated that almost 6% of children between two and five years-of-age had witnessed violence in their community during the previous year and one percent of children under two were exposed to a shooting in the previous year (Finkelhor, 2009). The current study found similar results for running out of food (23%), living with someone with a drug or alcohol problem (5%), and witnessing domestic violence (6%). However, this study had higher reports for other variables, with 18% of caregivers screening positive for depression, 7% of children having family members who had been victims of a violent crime, and 16% having family members who had been incarcerated. These differences could be due to differences in the wording of questions or in an actual higher prevalence that is related to the low-income sample. Indeed, rates of depression tend to be higher among women, minorities, people with less than a high school education, and those who are disabled, unemployed, or without health insurance (Center for Disease Control and Prevention [CDC]., 2010). In addition to higher rates of mental health and substance use, rates of violence are also higher in low-income populations compared to more general populations. Increasingly, young children growing up in the context of poverty are contending with the incarceration of a parent. Estimates are that 2 million children have an incarcerated parent (Grayson, 2007). One unique outcome for this group of children is managing the ambiguous loss of a parent, and its implications for attachment relationships and trauma (Bocknek, Sanderson, & Britner, 2009; Shlafer, & Poehlmann, 2010). The prevalence of these factors, along with their associations with social-emotional and academic outcomes, calls for practice and policy to attend to issues of adversity in the lives of children from low-income families.

Social-emotional outcomes. Some of the associations with social-emotional outcomes were in the expected direction – negative relationships between adversity and social emotional outcomes – initiative, self-regulation, and behavioral concerns. Behavioral concerns were higher with more adversity by .81 points for each additional adversity, for children experiencing average dosage. Similarly, the lower self-regulation scores (B=-.62) indicated worse outcomes for at-risk children with average dosage. This is in line with a growing body of research documenting the association between experience of adversity and its negative association with children's self-regulation (Hamoudi, Murray, Sorensen, & Fontaine, 2015). However, dosage was not consistently related to more positive outcomes for children, with more dosage associated with more behavioral concerns. This echoes other results showing more time in childcare being associated with lower social competence and more behavior problems (NICHD, 2002). Early childhood programs may play an important part in supporting children's resilience by helping to build self-regulation, social competence, and problem solving skills (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008; Raver et al., 2011). A recent meta-analysis showed stronger effects for social-emotional learning (SEL) when programs had specific interventions focused on SEL (Schindler et al., 2015).

Alternatively, it may be that the greater prevalence of risk within group care settings has a peer effect that would reduce outcomes for all children within the group (Bulotsky-Shearer, Dominguez, & Bell, 2012; Fantuzzo, LeBouef, & Rouse, 2014). The challenge of reducing stress and supporting social competencies is a challenge within the group care setting, and this challenge is further complicated with high proportions of children whose development may be compromised due to adversity. Interventions seeking to reduce behavior problems in classrooms might consider the concentrations of multi-risk children and families in a classroom or program.

Walsh (2006) suggests that those working with multi-stressed families be sensitive to this context by helping families prioritize amongst their many needs. Further, she emphasizes the need to overcome cycles of withdrawal and distrust, forge respectful partnerships, persistently communicate belief in the family's potential to overcome, and increase problem-solving and prevention skills as a shared activity (Walsh, 2006). This challenging aim of practice with families requires school staff who specialize in working with families experiencing stress and trauma.

School readiness. One of the stronger results of this study was the association of adversity to the BRSA (B=-1.10). Children with average dosage scored 1.10 points lower on the BRSA for each additional adversity. While a practical interpretation is that this is a small difference, it may be these small differences that are related to larger differences later. Analysis of growth trajectories in the Early Childhood Longitudinal Study – Kindergarten (ECLS-K) data documents that the gap in school readiness at kindergarten entry widens throughout schooling, highlighting the importance of arriving to kindergarten with strong skills (Layzer & Layzer, 2009).

Language. While the school readiness result was strong, the same relationship to adversity did not hold for receptive vocabulary (PPVT) or auditory comprehension (PLS). For children with average dosage, auditory comprehension had a trending negative association with family adversity and positive association with dosage. The PPVT was not significantly associated with adversity, but there was a 1.90 point gain for children experiencing an additional year in Educare with average adversity.

Academic knowledge can be considered a culture-specific skill, but language is a broader species-specific skill. These differing types of skills may develop differently in their association with risk (Masten & Monn, 2015). The narrow concepts assessed with the BRSA are most likely learned in the classroom. Unlike language, that can be learned in many contexts, these school-related concepts may be harder to grasp for children experiencing adversity. Self-regulation has been explored as a possible mediator, or path, to academic skills, with mixed results (Raver et al., 2011; Blair & Diamond, 2008). As self-regulation is negatively associated with adversity, classroom practices can incorporate an understanding of adversity within learning by considering the unique needs of children under stress. For example, children who have experienced a lot of stress may have dysregulated stress systems that perceive threat more rapidly than others, or be hyper-reactive (McLaughlin et al., 2015; Curtis & Cicchetti, 2013). In one study, a larger variety of classroom activities and materials was related to an unhealthy stress response, an increase in cortisol levels, after controlling for Emotional Support (Hatfield et al., 2013). More activity maybe stressful to children if teacher sensitivity is lacking. However, higher Emotional Support, measured by levels of warmth and sensitivity, has been associated with a decline in cortisol levels, indicating a healthier stress response (Hatfield, Hestenes, Kintner-Duffy, & O'Brien, 2013).

Self-regulation, and associated behavior, is closely linked to the stress response system. Insults to the ANS system through multiple family adversities may result in allostatic load and related health problems (Blair et al., 2011). This study has some evidence of this connection based on the association between adversity and health outcomes within this very young population. More adversity was related to a lower health rating and more identified health

problems. Health rating and the sum of health problems was not related to dosage and neither variable was moderated by dosage.

LIMITATIONS

A limitation of this study is the self-report of adversity by the families. Families had the right to choose whether to respond, possibly limiting the sample, and could also have provided a false response for questions that were uncomfortable. In most circumstances, this problem was somewhat ameliorated by the involvement of Family Support workers who had a relationship with these families and are tasked with using the interviews to better understand and support families.

Another limitation of this study was the lack of comprehensiveness about the adversities children experience. While parents were asked about a large set of difficult experiences impacting families, the chronicity and severity of adversities is unknown. Adversities such as children's experience of abuse or neglect were not included. Like drug abuse and domestic violence, these questions may not be answered by all families, but certainly have a negative impact on the development of children and are likely to coincide with additional stressors. While this study attempted to narrow the scope of cumulative risk to family adversity, rather than a mix of adversity and demographics, these risks could be further narrowed into economic and traumatic domains, or direct and indirect domains.

Another limitation was the cross-sectional nature of the sample, based on all children in the program across two years. While this provided a large snapshot of potential variation in children's experiences of adversity, it had two related limitations. First, 54% of the children included in this sample were still enrolled in the ece program the following year. This half of the sample had the potential to benefit from more time in the program. It is possible that more time in the program following the adversity would have a different pattern of associations with outcomes. While the cross-sectional method provided the benefit of seeing the association of adversity with child outcomes among the children who are likely to be in the program at any given time, it is limited in showing the potential for recovery from adversity, or resilience.

Analysis of a larger set of these data found somewhat different patterns between dosage and social emotional outcomes. Yazejian et al. (2015) found that while entering Educare earlier was associated with less regulation and more behavior concerns, additional years in the program were related to reduced negative outcomes over time for both self-control and behavior concerns. Likely reasons for the differences in findings between the two studies are in the sample and methods used. This study incorporated only the two most recent years of data collection, whereas Yazejian et al. used data gathered over six program years. The current study also did not impute for missing data, capitalize on the longitudinal nature of the data, or include age of entry along with time in care. The benefit of this cross-sectional approach, however, is that it has captured a natural grouping of adversity in a very recent group of children enrolled in programs serving low-income families.

The use of dosage as the main program variable could also be considered a limitation. The calculation of dosage, as years enrolled, does not capture specific days when the child attended. However, dosage does capture a measure of the interacting systems of home and school – as dosage is the amount of time the parent had access to the program. This level of

analysis seems appropriate to a study of family adversity because it measures potential time that family systems might interact with the early care and education system.

Closely related to the choice of dosage as the moderator, a limitation of this study is that it is correlational, with no control group with which to compare. Families brought their children to the program, and therefore selection bias is an issue in this sample as well. This bias is reduced by using a large variety of covariates that would be related to selecting into the program in the models, but is not eliminated.

Another limitation is the specificity of generalization. The age of children is mixed, from children under 1 year to children up to 5 years of age. While this allowed for a broader examination of the relationships, there are issues to consider. Children may develop different in the context of adversity at different ages. While younger children may be attuned to their parents' stress (Tronick & Beeghly, 2011; Waters, West, & Mendes, 2014), older children may be more likely to have difficulty understanding life changes (Bocknek et al., 2009). While exploration of these differences will be beneficial in future research, the exploration of these narrowed associations in children under 5 years is a first step. To control for the varying ages in the dataset, the child assessments were standardized, norm-referenced measures. The use of the norm-tables allow us to compare all children to others their same age with the same standardized score.

FUTURE DIRECTIONS

The focus of this paper was to separate experiential risk from demographic risk as a unique contribution to the broader literature showing cumulative risks predicting poorer outcomes for children. Additional research on domains of risk can inform us of the extent to which various forms of risk effect children, thereby prioritizing the foci of interventions or family support practices to have maximum benefit. Additionally, identifying how varying risks tend to correlate can help design programs for families around risks that tend to co-occur. For example, while risks correlated with each other and the overall adversity score, a cluster of domestic violence, drugs, and incarceration had slightly higher correlations with one another. If this were replicated in other samples, it would provide stronger evidence that programs addressing domestic violence will likely need to assist families with drug and alcohol issues, either dependency or co-dependency. These families may also benefit from information that would help a child cope with the ambiguous loss of a family member who becomes incarcerated (Bocknek et al., 2009).

Family development within the context of adversity provides a plethora of salient research directions from the micro-processes between children and their caregivers to the macro-processes of policies that ameliorate or worsen children's experience of adversity. Recent analysis of Early Head Start data indicates that the program was successful in reducing maltreatment (Green et al., 2014). Early education programs may serve as the settings in which interventions can successfully prevent or reduce the experience of other adversities as well.

Conclusion

The pattern of association showed worse initiative, self-regulation, school readiness, and health outcomes for more reported adversity. Of the outcomes in this study, only language and

attachment showed no negative association with adversity. Further, for children with average adversity, there was a positive association of dosage with initiative, language, and school readiness outcomes. The lack of moderation by dosage suggests that the relationship between adversity and child outcomes did not differ for children with differing levels of dosage. Another way of looking at this finding is that children experiencing varying adversities benefitted equally from time in the program, as evidenced by the relationship of higher dosage with higher outcomes given average adversity. The exception to this finding was the association of both adversity and dosage to higher behavioral concerns, an undesirable outcome.

These findings indicate that adversity may appear in classrooms with symptoms of self-regulation struggles, behavioral concerns, academic learning difficulties, and health problems. Data from this study provide evidence that practitioners providing high quality early care and education can influence negative trends in these areas. While this study did not find that high quality care was a protective fact or, it did support early education as a promotive factor of language and school readiness outcomes for children experiencing adversity. The mixed findings for social-emotional outcomes could imply that children experiencing adversity, including the adversity of poverty itself, may need more intensive social-emotional programming to help them build strengths in these areas. As family adversity is part of the story of these lower outcomes, involving families in building social-emotional strengths will be important as well.

This paper links the literature of cumulative risk with studies of adverse child experiences by examining the domain of cumulative experiential adversity – family dysfunction and economic hardship. It also adds to literature showing that demographically high risk families had better outcomes when children were enrolled in both EHS and HS (Raikes et al., 2013). Because more time in the program seemed to be a promotive factor in language, school readiness, and some social-emotional outcomes, development of policies that help retain high risk families may provide added and continued benefit to children.

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REFERENCES

Aber, L. (2012).Poor and low family incomes: Infant/toddler development, and the prospects for change: Back to the future. In S. L. Odom, E. P. Pungello & N. Gardner-Neblett (Eds.), *Infants, toddlers and families in poverty: Research implications for early child care* (pp. 281-306). New York, NY: The Guilford Press.

Ackerman, B. P., Brown, E. D., & Izard, C. E. (2004). The relations between persistent poverty and contextual risk and children's behavior in elementary school. *Developmental Psychology, 40*(3), 367-377. doi: 10.1037/0012-1649.40.3.367

Andrews, G. (1995). Composite International Diagnostic Interview (CIDI): RAND Health: Partners in Care study.

Appleyard, K., Egeland, B., Van Dulmen, M. H. M., & Sroufe, L. A. (2005). When more is not better: the role of cumulative risk in child behavior outcomes. *Journal of Child Psychology & Psychiatry, 46*(3), 235-245. doi: 10.1111/j.1469-7610.2004.00351.x

Ayoub, C., O'Connor, E., Rappolt-Schlictmann, G., Vallotton, C., Raikes, H., & Chazan-Cohen, R. (2009). Cognitive skill performance among young children living in poverty: Risk, change, and the promotive effects of Early Head Start. *Early Childhood Research Quarterly, 24*(3), 289-305. doi: http://dx.doi.org/10.1016/j.ecresq.2009.04.001

Blair, C., & Diamond, A. (2008). Biological processes in prevention and intervention: The promotion of self-regulation as a means of preventing school failure. *Development and Psychopathology, 20*(03), 899-911. doi: doi:10.1017/S0954579408000436

Blair, C., Raver, C., Granger, D., Mills-Koonce, R., Hibel, L., and the Family Life Project Key Investigators. (2011). Development and Psychopathology, 23, 845-857. doi: 10.1017/S0954579411000344.

Bierman, K. L., Nix, R. L., Greenberg, M. T., Blair, C., & Domitrovich, C. E. (2008). Executive functions and school readiness intervention: Impact, moderation, and mediation in the Head Start REDI program. *Development and Psychopathology, 20*(03), 821-843.

Bocknek, E., Sanderson, J., & Britner, P. (2009). Ambiguous loss and posttraumatic stress in school-age children of prisoners. *Journal of Child & Family Studies, 18*(3), 323-333. doi: 10.1007/s10826-008-9233-y

Bracken, B.A. (2007). Bracken School Readiness Assessment (3). San Antonio, TX, Pearson Assessments.

Brooks-Gunn, J., & Duncan, G. J. (1997). The effects of poverty on children. *The Future of Children, 7*(2), 55-71. doi: 10.2307/1602387

Bulotsky-Shearer, R. J., Dominguez, X., & Bell, E. R. (2012). Preschool classroom behavioral context and school readiness outcomes for low-income children: A multilevel examination of child-and classroom-level influences. *Journal of Educational Psychology, 104*(2), 421. doi: 10.1037/a0026301

Burchinal, M., Roberts, J. E., Zeisel, S. A., Hennon, E. A., & Hooper, S. (2006). Social risk and protective child, parenting, and child care factors in early elementary school years. *Parenting: Science & Practice, 6*(1), 79-113.

Camilli, G., Vargas, S., Ryan, S., & Barnett, W. S. (2010). Meta-analysis of the effects of early education interventions on cognitive and social development. *The Teachers College Record*, 112, 579-620.

Campbell, F. A., Ramey, C. T., Pungello, E., Sparling, J., & Miller-Johnson, S. (2008). Early childhood education: Young adult outcomes from the Abecedarian project. *Applied Developmental Science*, 6, 42-57.

Center for Disease Control and Prevention (CDC). 2010. Current depression among adults - United States, 2006 and 2008. MMWR 2010; 59: 1229-1235.

Curtis, W. J., & Cicchetti, D. (2013). Affective Facial Expression Processing in 15-Month-Old Infants Who Have Experienced Maltreatment: An Event-Related Potential Study. *Child Maltreatment, 18*(3), 140-154. doi: 10.1177/1077559513487944

Diamond, A. (2013). Executive Functions. *Annual Review of Psychology, 64*(1), 135-168. doi: doi:10.1146/annurev-psych-113011-143750

Dube, S. R., Dong, M., Chapman, D. P., Giles, W. H., Anda, R. F., & Felitti, V. J. (2003). Childhood abuse, neglect, and household dysfunction and the risk of illicit drug use: The adverse childhood experiences study. *Pediatrics, 111*(3), 564-572.

Duncan, G.J. & Brooks-Gunn, J. (1997). Income effects across the life span: Integration and interpretation. In G.J. Duncan & J. Brooks-Gunn (Eds.), *Consequences of growing up poor* (pp. 596-610). New York: Russell Sage Foundation.

Dunn, L.M. & Dunn, D.M. (2007). Peabody Picture Vocabulary Test (4). San Antonio, TX: Pearson Assessments.

Educare Implementation Study (EIS) (2007). Life events scale. Unpublished manuscript. Chapel Hill, NC: Frank Porter Graham Child Development Institute.

Evans, G. W. (2004). The environment of childhood poverty. *American Psychologist, 59*(2), 77-92. doi: 10.1037/0003-066x.59.2.77

Evans, G. W., & Kim, P. (2013). Childhood Poverty, Chronic Stress, Self-Regulation, and Coping. *Child Development Perspectives, 7*(1), 43-48. doi: 10.1111/cdep.12013

Evans, G. W., Li, D., & Whipple, S. S. (2013). Cumulative risk and child development. *Psychological Bulletin, 139*(6), 1342-1396. doi: 10.1037/a0031808 10.1037/a0031808.supp

Fantuzzo, J. W., LeBoeuf, W. A., & Rouse, H. L. (2014). An investigation of the relations between school concentrations of student risk factors and student educational well-being. *Educational Researcher, 43*(1), 25-36. doi: 10.3102/0013189x13512673

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A., Edwards, V., Koss, M.P., Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The adverse childhood experiences (ACE) study. *American Journal of Preventive Medicine, 14*(4), 245-258.

Finkelhor, D., & United States. Office of Juvenile Justice and Delinquency Prevention. (2009). Children's exposure to violence: A comprehensive national survey. Washington, DC: U.S. Dept. of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention.

Gassman-Pines, A., & Yoshikawa, H. (2006). The effects of antipoverty programs on children's cumulative level of poverty-related risk. *Developmental Psychology, 42*(6), 981-999. doi: 10.1037/0012-1649.42.6.981

Grayson, J. (2007). Children of incarcerated parents, Virginia Child Protection Newsletter. Retrieved from https://www.ncjrs.gov/App/Publications/abstract.aspx?ID=243481Guss, S., Norris, D. J., Horm, D. M., Monroe, L. A. & Wolfe, V. (2013). Lessons learned about data utilization from classroom observations. *Early Education & Development, 24,* 4-18. doi:10.1080/10409289.2013.739543

Green, B.L., Ayoub, C., Dym-Bartlett, J., VonEnde, A. Furrer, C., Chazan-Cohen, R., Vallotton, C., & Klevens, J. (2014). The effects of Early Head Start on child welfare system involvement: A first look at longitudinal child maltreatment outcomes. *Children and Youth Services Review*, 42, 127-35.

Hamoudi, A., Murray, D.W., Sorensen, L., & Fontaine, A. (2015). Self-regulation and toxic stress: A review of ecological, biological, and developmental studies of self-regulation and stress. OPRE Report # 2015-30, Washington, DC: Office of Planning, Research, Evaluation, and Administration for Children and Families, U.S. Department of Health and Human Services.

Hatfield, B.E., Hestenes, L.L., Kintner-Duffy, V.L., O'Brien, M. (2013). Classroom Emotional Support predicts differences in preschool children's cortisol and alpha-amylase levels. Early Childhood Research Quarterly, 28, 347-356. doi: http://dx.doi.org/10.1016/j.ecresq.2012.08.001

Henry, C. S., Sheffield Morris, A., & Harrist, A. W. (2015). Family Resilience: Moving into the Third Wave. *Family Relations, 64*(1), 22-43. doi: 10.1111/fare.12106

Irvine, J.J. (2010). Foreword. In H.R. Milner (Ed.), Culture, curriculum, and identity in education (p.xii). New York, NY: Palgrave MacMillan.

Johnson, S.B., Riley, A.W., Granger, D.A., Riis, J. (2013). The science of early life toxic stress for pediatric practice and advocacy. *Pediatrics*, 131(2), 319-327. doi: 10.1542/peds.2012-0469

Jones Harden, B., Monahan, C., & Yoches, M. (2012). Infant/toddler care and high-risk families: Quality services for "omitted" children. In S. L. Odom, E. P. Pungello & N. Gardner-Neblett (Eds.), *Infants, toddlers and families in poverty: Research implications for early child care* (pp. 281-306). New York, NY: The Guilford Press.

Layzer, J.I, Layzer, C.J. (2009, October). A working meeting on recent school readiness research: Guiding the synthesis of early childhood research. Washington, DC: National Center on Children in Poverty. http://aspe.hhs.gov/

LeBuffe, P. & Naglieri, J. (1999). Devereux Early Childhood Assessment. Lewisville, NC: Kaplan Press.

LeBuffe, P. & Naglieri, J. (2012). Devereux Early Childhood Assessment – Preschool [DECA-P2]. Lewisville, NC: Kaplan Early Learning Company.

Lee, R., Zhai, F., Brooks-Gunn, J., Han, W., & Waldfogel, J. (2014). Head Start participation and school readiness: Evidence from the Early Childhood longitudinal Study-Birth cohort. *Developmental Psychology, 50,* 202-215. doi: 10.1027/a0032280.

Mackrain, M., LeBuffe, P., & Powell, G. (2007). Devereux Early Childhood Assessment for Infants and Toddlers [Infant and Toddler]. Lewisville, NC: Kaplan Early Learning Company.

Masten, A. S., & Monn, A. R. (2015). Child and Family Resilience: A Call for Integrated Science, Practice, and Professional Training. *Family Relations, 64*(1), 5-21. doi: 10.1111/fare.12103

McLaughlin, K. A., Sheridan, M. A., Tibu, F., Fox, N. A., Zeanah, C. H., & Nelson, C. A. (2015). Causal effects of the early caregiving environment on development of stress response systems in children. *Proceedings of the National Academy of Sciences of the United States of America*, *112*(18), 5637–5642. http://doi.org/10.1073/pnas.1423363112

Mistry, R. S., Benner, A. D., Biesanz, J. C., Clark, S. L., & Howes, C. (2010). Family and social risk, and parental investments during the early childhood years as predictors of low-income children's school readiness outcomes. *Early Childhood Research Quarterly, 25*(4), 432-449. doi: http://dx.doi.org/10.1016/j.ecresq.2010.01.002

NICHD Early Child Care Research Network. (2002). Early child care and children's development prior to school entry: Results from the NICHD Study of Early Child Care. *American Educational Research Journal, 39*, 133-164.

Raikes, H., Vogel, C., & Love, J. M. (2013). Family subgroups and impacts at ages 2, 3, and 5: Variability by race/ethnicity and demographic risk. *Monographs of the Society for Research in Child Development*, 64-92.

Raver, C. C., Jones, S. M., Li-Grining, C., Zhai, F., Bub, K., & Pressler, E. (2011). CSRP's Impact on Low-Income Preschoolers' Preacademic Skills: Self-Regulation as a Mediating Mechanism. *Child Development,* 82(1), 362-378. doi: 10.1111/j.1467-8624.2010.01561.x

Ruzek, E., Burchinal, M., Farkas, G., & Duncan, G. J. (2014). The quality of toddler child care and cognitive skills at 24 months: Propensity score analysis results from the ECLS-B. *Early Childhood Research Quarterly, 29*(1), 12-21. doi: http://dx.doi.org/10.1016/j.ecresq.2013.09.002

Sacks, V., Murphey, D., Moore, K. (2014). *Adverse childhood experiences: National and state-level prevalence*. (Publication #2014-28). Retrieved from Child Trends website: http://www.childtrends.org/wp-content/uploads/2014/07/Brief-adverse-childhood-experiences_FINAL.pdf

Sameroff, A. J., & Seifer, R. (1983). Familial Risk and Child Competence. *Child Development, 54*(5), 1254-1268. doi: 10.1111/1467-8624.ep12432700

Schindler,H., Kholoptseva, J., Oh, S. Yoshikawa,H., Duncan, G., Magnuson, K. Shonkoff, J. (2015). Maximizing the potential of early childhood education to prevent externalizing behavior problems: A meta-analysis, Journal of School Psychology, 53 (3). p. 243-263. doi: http://dx.doi.org/10.1016/j.jsp.2015.04.001.

Schweinhart, L. J., Montie, J., Xiang, Z., Barnett, W. S., Belfield, C. R., & Nores, M. (2005). Lifetime effects: The HighScope Perry Preschool study through age 40. Ypsilanti, MI: HighScope Press.

Shlafer, R. J., & Poehlmann, J. (2010). Attachment and caregiving relationships in families affected by parental incarceration. Attachment & Human Development, 12, 395– 415.doi:10.1080/14616730903417052

Shonkoff, J. P., & Garner, A. S. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics, 129*(1), 232-246. doi: 10.1542/peds.2011-2663

Stanton-Chapman, T. L., Chapman, D. A., Kaiser, A. P., & Hancock, T. B. (2004). Cumulative risk and low income children's language development. Topics in Early Childhood Special Education, 24, 227-237.

Tronick, E., & Beeghly, M. (2011). Infants' meaning-making and the development of mental health problems. *American Psychologist, 66*(2), 107-119. doi: 10.1037/a0021631

Walsh, F. (2006). Strengthening resilience in vulnerable multistressed families. In J. Nageotte (Ed.), Strengthening family resilience (2nd ed., pp. 251-287). New York: Guilford Press.

Watamura, S. E., Phillips, D. A., Morrissey, T. W., McCartney, K., & Bub, K. (2011). Double jeopardy: Poorer social-emotional outcomes for children in the NICHD SECCYD experiencing home and child-care environments that confer risk. *Child Development,* 82(1), 48-65. doi: 10.1111/j.1467-8624.2010.01540.x

Waters, S. F., West, T. V., & Mendes, W. B. (2014). Stress contagion: Physiological covariation between mothers and infants. *Psychological Science, 25*(4), 934-942. doi: 10.1177/0956797613518352

Weiland, C., & Yoshikawa, H. (2013). Impacts of a prekindergarten program on children's mathematics, language, literacy, executive function, and emotional skills. *Child Development,* 84(6), 3223-2130. doi: 10.1111/cdev.12099.

Wen, X., Leow, C., Hahs-Vaughn, D. L., Korfmacher, J., & Marcus, S. M. (2012.) Are two years better than one year? A propensity score analysis of the impact of Head Start program duration on children's school performance in kindergarten. *Early Childhood Research Quarterly, 27,* 684-694. doi:10.1016/j.ecresq.2011.07.006

Yazejian, N., Bryant, D., Freel, K., Burchinal, M., & the Educare Learning Network Investigative Team (2015). High-quality early education: Age of entry or time in care differences in student outcomes for English-only and dual language learners. *Early Childhood Research Quarterly*, 32(0), 23-39. doi: http://dx.doi.org/10.1016/j.ecresq.2015.02.002

Yoshikawa, H., Aber, J. L. & Beardslee, W. (2012). The effects of poverty on the mental, emotional, and behavioral health of children and youth: Implications for prevention. *American Psychologist*, 67(4), 272-284. http://dx.doi.org/10.1037/a0028015

Yumoto, C., Jacobson, S., & Jacobson, J. (2008). Fetal substance exposure and cumulative environmental risk in an African American cohort. *Child Development*, 79(6), 1761–1776.

Zaslow, M. Anderson, R., Redd, Z., Wessel, J., Tarullo, L., & Burchinal, M. (2010). *Quality dosage, thresholds, and features in early childhood settings: A review of the literature.* (*OPRE 2011-5*.) Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.

Zimmerman, I. L., Steiner, V. G., & Pond, R. E. (2011). *Preschool language scales - fifth edition (PLS-5).* Bloomington, MN: Pearson.