Published in final edited form as:
J Fam Psychol. 2014 June ; 28(3): 391–400. doi:10.1037/a0036683.

Are All Risks Equal? Early Experiences of Poverty-Related Risk and Children's Functioning

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Abstract

Using cumulative risk and latent class analysis (LCA) models, this research examines how exposure to deep poverty (income-to-needs ratio <.50) and four poverty-related risks (single-parent household, residential crowding, caregiver depression, and multiple life stressors) in preschool is related to children's future difficulty in school in a longitudinal sample of 602 Head-Start enrolled, low-income families. Results from the LCA revealed four risk profiles: low risk, deep poverty and single, single and stressed, and deep poverty and crowded household. Tests of measurement invariance across racial/ethnic groups established that although patterns of risk are similar across groups (i.e. risks co-vary in the same way), the prevalence of risk profiles differ. African American families were over-represented in the 'deep poverty and single' profile while Latino and White families were over-represented in the 'deep poverty and crowded' profile. Finally, children's third grade functioning in three domains (academic performance, behavior problems, self-regulatory skills) was predicted using a cumulative risk index and LCA identified risk profiles. Both approaches demonstrated that children who experienced higher levels of risk in preschool had worse school performance than children with low levels of risk. However, the LCA also revealed that children who experienced 'single and stressed' family settings had more behavior problems than low risk children while children who experienced 'deep poverty and crowded' family settings had worse academic performance. The results indicate that all risks are not equal for children's development and highlight the utility of LCA for tailoring intervention efforts to best meet the needs of target populations.

Keywords

deep poverty; poverty-related risks; latent class analysis; academic outcomes; self-regulation

It has been well-established that early exposure to poverty is linked to children's future functioning along multiple domains including behavior problems (Linver, Brooks-Gunn, & Kohen, 2002), self-regulatory skills (Raver, Blair, Willoughby, & TFLPKI, 2013), and academic performance (Duncan & Brooks-Gunn, 1997; Duncan, Yeung, Brooks-Gunn, & Smith, 1998). Moreover, the experience of growing up poor does not happen in isolation, but rather co-occurs with a wide array of other family hardships, such as residence in a single-parent family or parental stress. These multiple poverty-related hardships are also

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consistently linked to negative outcomes for children (Aber, Jones, & Raver, 2007; Yoshikawa, Aber, & Beardslee, 2012). Selecting three broad indicators of performance in school as outcome criteria, the following paper examines how we might best conceptualize and model the roles of poverty and multiple poverty-related risks for a sample of low-income, ethnic minority families living in urban neighborhoods of concentrated disadvantage.

Researchers have long recognized the empirical challenges of trying to accurately and comprehensively capture the ways that poverty co-occurs with other poverty-related risk factors. One approach to this challenge has been the use of cumulative risk models (e.g. Sameroff, Seifer, Baldwin, & Baldwin, 1993). This approach makes the assumption that it is the *accumulation*, rather than the content, of risk that matters most for children's functioning. Cumulative risk indices, which quantify the number of risks present in the child's life, have been shown to be predictive of children's outcomes across multiple domains (e.g. Deater-Deckard, Dodge, Bates, Pettit, 1998; Gutman, Sameroff, & Eccles, 2002). However, cumulative risk models fail to consider the ways that poverty and risk factors may be configured, ignoring the fact that different *combinations* of risk may be differentially related to children's outcomes. Recently, several investigators have begun to consider how a person-centered approach to modeling risk, using latent class analysis (LCA), may offer an informative alternative to traditional cumulative risk approaches (Lanza, Rhoades, Greenberg, Cox, & TFLPKI, 2011, p. 391; Copeland, Shanahan, Costello, & Angold, 2009). This approach has been used to consider ways that risks may coincide to predict negative outcomes in infancy (Rhoades, Greenberg, Lanza, & Blair, 2011), clinical outcomes in later childhood (Copeland et al., 2009), and academic trajectories in adolescence (Suarez-Orozco et al., 2010). To our knowledge, however, this approach has not been used extensively to understand the constellations of risk that may put children in jeopardy for school failure during the preschool and early elementary years.

In the following study, we compare the relative contributions of cumulative risk and LCA models in exploring how children's early experiences of deep poverty (income to needs ratio <.5), and four other key risks (residence in a single-parent household, residential crowding, caregiver depression, and stressful life events) in preschool are related to their academic performance, behavior problems, and self-regulatory skills in third grade. Given that poverty and risk are unequally distributed across racial/ethnic groups, we also consider whether risk profiles demonstrate measurement invariance for different racial/ethnic groups. In this way we explore whether all risks are equal or whether early exposure to unique combinations of risk may have differential consequences for children's longer-term school performance.

Evidence for the Roles of Poverty, Poverty-Related Risk, and Children's Outcomes

There is a clear detrimental relationship between growing up in a poor family and children's cognitive functioning and academic performance (Aber, Bennet, Li, & Conley, 1997; Duncan & Brooks-Gunn, 1997; Yoshikawa et al., 2012). Children living in poverty also have higher levels of behavior problems than more privileged children (Linver et al., 2002; Mistry, Vandewater, Huston, & McLoyd, 2002; NICHD ECCRN, 2005), and poverty is

predictive of compromises in children's executive function and self-regulatory skills (Hackman & Farah, 2009; Noble, McCandliss, & Farah, 2007; Raver et al., 2013). Importantly, the depth of poverty also matters when considering families' experience of multiple, poverty-related risks: Both social scientists and agency directors recognize that "deep poverty" can be debilitating to families when they must try to make ends meet on incomes at or below .50 of the poverty threshold (Moore, Redd, Burkhauser, Mbwana, & Collins, 2009). In the following paper, we consider the ways that time spent in "deep poverty" may represent an important yet under-recognized risk for children's later school performance, among a sample of families living in poor neighborhoods that are income-eligible for Head Start, a publicly funded preschool program.

The experience of poverty does not occur in isolation, but rather, is often confounded with other family-level structural, social, and psychological stressors (Aber et al., 2007; Gershoff, Aber, Raver, & Lennon, 2007). Research on family structure and residential crowding highlight the salience of these two structural characteristics for children's development, particularly among low-income families. Family structure and poverty are interrelated with a higher percentage of single-parent families living in poverty relative to married-couple families (Redd, Sanchez Karver, Murphey, Anderson Moore, & Knewstub, 2011). And although it is difficult to disentangle the influence of poverty from family structure, there is a large body of research linking family structure and children's outcomes, with children raised in single-parent families faring worse in academic achievement, conduct, psychological adjustment, and social relations than children of consistently married parents (Amato, 2001; McLanahan & Sandefur, 1994). Prior work has also shown that residential crowding, which is a risk more likely to occur among the urban, poor (Evans & Saegert, 2000), has strong negative consequences for children's academic achievement and behavioral adjustment (Evans, Lepore, Shejwal, & Palsane, 1998)

In addition to structural characteristics, poverty-related risk can manifest as psychological strain or life stressors. Theoretical models detailing the processes through which economic hardship affects children have proposed parental stress and/or depression as a key mediating mechanism (Conger & Elder, 1994; Gershoff et al., 2007; McLoyd, 1990). The stress of living in poverty may manifest itself in terms of depressive symptoms or psychological distress which, in turn, may negatively affect children's outcomes through detrimental effects on parenting behavior. Poverty and maternal depressive symptoms can operate in synergistic as well as additive ways that place children of depressed parents at higher risk for academic, behavioral, and social-emotional problems (Bodovski & Youn, 2010; Cummings & Davies, 1999; Downing & Coyne, 1990; Meadows, McLanahan, & Brooks-Gunn, 2007). Families facing poverty are also more likely to experience other life stressors (e.g. loss of a job, inability to pay bills) that may exacerbate the strains of poverty and negatively impact their children's school performance (Dohrenwend, 1973; Langer & Michael, 1963). Prior research has found negative life events to be related to children's cognitive skills (Van der Heijden, Suurland, Swaab, & de Sonneville, 2011) and behavior problems (Attar, Guerra, & Tolan, 1994; Harland, Reijneveld, Brugman, Verloove-Vanhorick, & Verhulst, 2002).

Racial/Ethnic Differences in Risk Exposure and Children's Outcomes

Poverty and risk are unequally distributed across racial and ethnic groups in the United States. Greater proportions of African-American (35%) and Latino (31%) children live in poverty compared to White (11%) and Asian (15%) children (Wight, Chau, & Aratani, 2010). In addition, family risk factors are more prevalent among racial/ethnic minority families compared with White families (Hatch & Dohrenwend, 2007; Kilmer, Cowen, Wyman, Work, & Magnus, 1998). Although African-American and Latino children have higher rates of exposure to poverty and risk, the relationship between certain risks and developmental outcomes also varies by race/ethnicity. For example, one set of analyses has demonstrated that single-parent-headed household status appears to be less clearly associated with negative child outcomes for African-American and Latino children, when compared to their White counterparts (Foster & Kalil, 2007). Racial and ethnic differences in risk exposure and relationships between risk and children's outcomes highlights the importance of considering racial/ethnic variation in the co-occurrence of risk and the prevalence of risk profiles. Once measurement invariance is established, both researchers and practitioners may place greater trust in the inferences that are drawn from profiles of risk (Knight & Hill, 1998).

Methods for Modeling Risk

Researchers interested in poverty and children's development have long recognized the co-occurrence of poverty with other family-level risk factors, and as such, have sought the appropriate analytic approach for modeling these relationships. One commonly used method is the cumulative risk model, which by operationalizing risk as an additive index of risk factors, makes the assumption that it is the *accumulation*, rather than the type of risk, that matters most for children's development. It has been argued that cumulative risk models may provide the most comprehensive representation of the overall levels of adversity faced by children in high-risk settings (Luthar, 1993). However, cumulative risk models have also been criticized for various reasons including the loss of information on individual variables when risks are summed (Burchinal, Roberts, Hooper, & Zeisel, 2000) and the difficulty in considering intersections between multiple risk factors (Magnusson & Bergman, 1990). Moreover, when risks are treated as interchangeable, it becomes much more difficult to develop targeted intervention strategies to best meet the needs of the highest risk populations.

In recent years, researchers have begun to use person-centered approaches, such as latent class analysis (LCA) to model the complexity of poverty and poverty-related risk factors. In comparison to variable-centered analytic approaches that identify relationships between variables, person-centered approaches are used to identify qualitative differences between individuals (Collins & Lanza, 2010). In the context of modeling risk, person-centered approaches allow for the identification of subgroups of children experiencing similar *combinations* of risk factors, therefore providing a more holistic picture of environmental risk and offering insight into potential points of intervention. While person-centered approaches have the potential to offer insight into the co-occurrence of risk, findings can be shaped by sample characteristics and modeling approaches, raising questions about

generalizability. Therefore, building evidence from research using LCA to examine relationships between adversity and children's outcomes is necessary to identify commonalities across studies. In prior work, conducted with both rural and urban samples, LCA models have identified families with high risk profiles; profiles that were associated with detriments in children's future academic performance and behavior (Lanza et al., 2010) and self-regulatory skills (Rhoades et al., 2011). In addition, while studies using LCA to model the co-occurrence of risk vary in the specific profiles that are identified, poverty and marital status consistently emerge as important indicators (Copeland et al., 2009, Lanza, Rhoades, Nix, Greenberg, & TCPPRG, 2010; Rhoades et al., 2011).

The Current Study

Using cumulative risk and LCA models, the current study examines the relationship between poverty and poverty-related risk experienced in preschool and children's later school functioning in three areas: academic performance, problematic behavior, and self-regulatory skills. By drawing on a sample in which all families fell below the federal poverty guidelines at baseline, we explore how poverty-related risks co-occur within a *high-risk* sample. In addition, because the majority of the families in the sample are African-American or Latino, we are able to consider whether the co-occurrence of risk and prevalence of risk profiles was equivalent across racial/ethnic groups. Finally, capitalizing on longitudinal data we explore how differential exposure to risks in pre-school is related to children's functioning in third grade, offering insight into how early risk exposure may have long-term consequences for children's development. Based on theory and past findings on cumulative risk, we expect that a higher number of risks in pre-school will be associated with lower levels of functioning across all domains in third grade. Moreover, similar to cumulative risk models, LCA models will reveal both low and multi-risk risk profiles and children exposed to low risk family settings will have better school outcomes in third grade while children exposed to multi-risk settings will have worse. However, we also expect that deep poverty and single-parent household will emerge as salient indicators of risk, although how they may relate to children's school performance in third grade remains unclear.

Methods

Sample

Data for the present study come from the Chicago School Readiness Project (CSRP), a socioemotional intervention trial implemented in 35 classrooms (N = 602 children) within 18 Head Start sites located in 7 highly disadvantaged Chicago neighborhoods. Children and their caregivers were first assessed in 2004 in the fall of the Head Start year. Families were followed up 4 years after initial enrollment, when participating children were in early elementary school (with the largest proportion enrolled in the third grade). Information on poverty and poverty-related risk factors was collected from caregivers in the fall of the Head Start year either in person or by phone. All caregiver questionnaires were administered either in English (89%) or Spanish (11%) depending on the preference of the caregiver.

At baseline, the average caregiver age was 29.53 years (*SD* = 7.66). Seventy percent of caregivers identified as African-American, 26% identified as Latino, and 4% identified as

non-Hispanic White. Among the children in the sample, there were slightly more girls (53%) than boys. On average, children were 49.16 (*SD* = 7.38) months old. The average income-to-needs ratio for the sample was 0.67 (*SD* = 0.59), indicating that the majority of children came from households whose income and family size placed them below the national poverty line.

Measures

All risks were dichotomized with 1 indicating the presence of a risk and 0 the absence and a cumulative risk index was created by summing across the six risks. Dichotomized risks were used with LCA to facilitate comparison between cumulative risk and LCA methods. In the absence of established cutoff points, variables were dichotomized so that individuals with scores above the sample 75th percentile on each variable were coded as 'at risk'. Although this approach is not ideal, it has been used in other LCA studies (Rhoades et al., 2011) and the resultant cut points were similar to those used in prior work (Lanza et al., 2011; Prochaska, Sung, Max, Shi, & Ong, 2012)

Deep Poverty—A family was coded as being in deep poverty if their income-to-needs ratio for the previous year was less than half of the federal poverty threshold or .5. A family's income-to-needs ratio is calculated based on yearly earnings and family size (Moore et al., 2009; U.S. Bureau of the Census, 2012).

Poverty-Related Risk Factors—Four additional risks were included in the analyses: single-parent household, large household, caregiver depression, and stressful life events. Caregivers were coded as being in a *single-parent household* if they were not married and not living with a partner. Families were coded as having a *large household* if they had 6 or more people living in the household. A measure of *caregiver depression* was based on caregivers' responses on the K6, a six question screening scale of psychological distress (e.g. "During the past 30 days how often did you feel nervous?"; Kessler et al., 2002). Answers were given on a 5-point scale (1 = *none of the time* to 5 = *all of the time*). Responses to all six items were summed and caregivers with scores of 7 or higher were coded as being at risk. Exposure to *stressful life events* was determined using caregivers' responses to a measure of recent life changes. Drawing from other measures of family stress and stressful life events (McCubbin & Patterson, 1981; Sarason, Johnson, & Siegel, 1978), the measure included in the current study consisted of 13 negative life events families may experience (i.e. financial strains, family transitions, housing problems). Caregivers were asked whether anyone in their home had experienced each event (e.g. "Someone in my family was laid off or had a cut in wages") in the past year. Individuals who had experienced 5 or more stressors in the past year were coded as at risk.

Caregiver race/ethnicity—Caregiver's reported their race/ethnicity at baseline. A dummy variable was created to represent whether African-American (coded as 1) or Latino/White (coded as 0). Given the small number of White caregivers it was impossible to make cross-group comparisons using White as a standalone group.

Children's outcomes in early elementary grades—Children's functioning was measured when children were in second or third grade via school records (academic performance), caregiver report (behavior problems), and teacher report (self-regulatory skills).

Academic performance: Chicago Public Schools provided information from administrative school records on participating children's grades at the end of the third grade year. Grades were coded from 1 (letter grade of F) to 5 (letter grade of A). In the current study, we examine children's academic performance in two areas, literacy and math. Based on an analysis of the underlying factor structure, a literacy aggregate was created by taking the mean of students' grades across three subjects: reading, writing, and listening. Academic performance in math is based on student's grades in one class, math standards.

Behavior problems: Children's behavior problems were measured when children were in third grade via caregivers' responses on the Behavior Problems Index (BPI; Peterson & Zill, 1986). Caregivers rated the degree to which 26 items described their child (0 = *not true* to 2 = *very/often true*). Items were averaged to create two scales: internalizing (10 items, $\alpha = .75$) and externalizing (18 items, $\alpha = .90$) problems. Subscales were created replicating the approach used in the National Longitudinal Survey of Youth 1979 (Center for Human Resource Research, 2009).

Self-regulatory skills: Teachers reported on children's self-regulatory skills in two domains: cognitive and behavioral. A composite of two measures, the Barratt Impulsiveness Scale, Version 11 (BIS-11; Patton, Stanford, & Barratt, 1995) and the Behavior Rating Inventory of Executive Function (BRIEF; Gioia, Isquith, Guy, & Kenworthy, 2000), was used to assess children's self-regulatory skills. This approach has been shown to be reliable and valid in samples of low-income, ethnic minority school-aged children (McCoy, Raver, Lowenstein, & Tirado-Stayer, 2011). The cognitive dysregulation scale is the average of 19 items that tap into children's ability to use working memory and to employ cognitive flexibility ($\alpha = .96$, e.g. "Has short attention span"). The behavioral dysregulation scale is the average of 17 items that measure children's ability to modulate their attention, behavior, and emotions ($\alpha = .96$, e.g. "Interrupts others"). Because the two measures have different response scales (BIS 1–4, BRIEF 1–3), all items were standardized to be on a 0 to 1 scale before scale creation. This was done by rescaling all items to begin at zero and then dividing by either 3 (BIS) or 2 (BRIEF).

Analytic Overview

As a first step, the cumulative risk index, calculated when children were in preschool, was used to predict each of the six outcomes measured when children were in third grade. Next, to identify risk subgroups at baseline using LCA, deep poverty and poverty-related risk variables were used as observed indicators in LCA models run in MPlus v6 (Muthen & Muthen, 1998–2010). After deciding upon the best-fitting model, caregiver race/ethnicity was used as a grouping variable to test for measurement invariance across classes. Finally, to test whether children's academic performance, behavior problems, and self-regulatory skills in third grade varied by risk profile at baseline, each outcome was included in the

model individually and outcome means were allowed to vary across classes. The inclusion of outcomes into the model is preferred over a classify and analyze approach where individuals are first assigned their most likely class membership and then relationships between class assignment and outcomes are examined because the former approach takes into account classification uncertainty in latent class membership (Collins & Lanza, 2010). MPlus employs a full-information maximum likelihood (FIML) approach to missing data, using information from individuals with complete data and partially complete data. However, FIML approaches cannot handle missingness on covariates in latent class models. Therefore, the models including race/ethnicity were run on a reduced sample with full information on race/ethnicity (N = 576).

Results

Descriptive Statistics and Cumulative Risk Index

The proportion of families categorized as 'at risk' across indicators is as follows: poor (43%), single (61%), large household (23%), depressed (23%), and high life stress (16%). The cumulative risk index ranges from 0–5 (M = 1.56, SD =1.09) with the majority of families (79%) experiencing 2 or fewer risks. A test of racial/ethnic differences revealed that African American (M = 1.72, SD =1.04) families experienced slightly more risks than Latino and White (M = 1.42, SD = 1.09) families; $t(574) = -3.13$, $p < .01$. Correlations between all risk indicators, race/ethnicity and distal child outcomes are provided in Table 1. The highest correlation between risks is .26 (between poor and large household) indicating that although related, the indicators are capturing different domains of family risk.

To examine relationships between the cumulative risk index and children's outcomes in third grade, models were estimated in which each outcome was regressed on the cumulative risk index and caregiver race/ethnicity. The risk index significantly predicted internalizing (β = .12, SE = .01, p = .02) and externalizing (β = .15, SE = .05, $p < .01$) behavior problems and literacy (β = −.10, SE = .05, p = .06) at trend level. With each additional risk experienced in preschool, children had increased behavior problems and lower school performance in third grade.

Identifying Latent Classes of Risk at Baseline

LCA was used to identify subgroups of families with similar risk profiles based on response patterns to the five risk variables. The likelihood-ratio difference test (G^2 Δ) with a parametric bootstrap approach, information criteria (AIC [Akaike information criterion], BIC [Bayesian information criteria]), and conceptual clarity were used to inform model selection (Collins & Lanza, 2010). The likelihood-ratio difference test can be used with nested models to determine whether Model A (with C classes) fits the data equally well as Model B (with C-1) classes. The null hypothesis assumes that Model B is the true model and that Model A fits the data as well as Model B. A small p-value indicates that the null hypothesis can be rejected indicating that Model A provides a better fit to the data than Model B. The AIC and BIC are fit indicators that balance considerations of fit and parsimony when choosing between models. Smaller values on information criteria represent a better balance of model fit and parsimony. LCA models were run with one to five classes

and a four-class model was selected based on fit statistics and model clarity. Although the three-class model had the lowest BIC, the four-class model had the lowest AIC and the likelihood-ratio difference test was only non-significant when comparing the 5-class model to the 4-class model (One class: G^2 Δ p-value = N/A, AIC = 3238, BIC = 3260; Two classes: G^2 Δ p-value = .00, AIC = 3195, BIC = 3243; Three classes: G^2 Δ p-value = .00, AIC = 3164, BIC = 3239; Four classes: G^2 Δ p-value = .02, AIC = 3162, BIC = 3263; Five classes: G^2 Δ p-value = .95, AIC and BIC not estimated because of model errors).

A latent class model estimates two sets of parameters: latent class prevalences and item-response probabilities (Table 2). Latent class prevalences represent the proportion of the sample that falls within each class. Item response probabilities indicate the probability of experiencing a risk given membership in a particular class. The item response probabilities were used to interpret the latent classes and assign meaningful labels. The first profile, which was labeled ‘low risk’, had the highest prevalence among the sample (47%) and had low probabilities on all of the items, with the slight exception of being single which had a probability of .57. The second profile, which was labeled ‘deep poverty and single’, also had a high prevalence among the sample (40%) and was characterized by high probabilities of being in deep poverty and being single. Profile three, ‘single and stressed’, had a prevalence of 9% and was characterized by high probabilities of being single, experiencing high levels of psychological distress and life stressors. Profile four, ‘deep poverty and crowded’, had the lowest prevalence in the sample (5%) and was characterized by high probabilities of being in deep poverty and living in a crowded household.

Measurement Invariance across Classes

A two-step approach was taken to test for measurement invariance by race/ethnicity. First, an LCA using the same five risk variables and specifying one through five classes was run separately among African American and Latino/White respondents. These analyses were also run excluding the 23 families who identified as White revealing a similar pattern of findings. Therefore, the decision was made to retain the 23 families who identified as White in order to maximize power. Results from the analyses revealed that a four-class model provided the best fit for the data and a similar pattern of classes emerged within each group. Next, a multigroup LCA was run to test for invariance of classes across groups. This involved running three models where both groups were modeled as having four latent classes. In the first unconstrained model, latent class prevalences and item response probabilities were allowed to vary across groups. In the second semi-constrained model, item response probabilities were constrained to be equal across groups but class prevalences were allowed to vary. Finally, a fully constrained model was run in which both class prevalences and item response probabilities were constrained to be equal. The three models were compared using G^2difference tests. The G^2difference test between models 1 and 2 was not significant ($G^2_2 - G^2_1 = 20.30$, $df = 19$, $p = .38$) indicating item response probabilities are equivalent across groups. The G^2difference test between models 2 and 3 is significant ($G^2_3 - G^2_2 = 20.22$, $df = 2$, $p = .00$) indicating that class prevalences vary across groups. An examination of the class prevalences within each racial/ethnic group revealed that the largest discrepancies between racial/ethnic groups were in the ‘deep poverty and single’ and ‘deep poverty and crowded’ classes (low risk: AA = 33%, L/W = 44%; deep poverty and single:

AA = 44%, L/W = 16%; single and stressed: AA = 10%; L/W = 12%; deep poverty and crowded: AA = 13%, L/W = 28%). African American families had higher rates of prevalence in the ‘deep poverty and single’ class while Latino/White families had higher rates of prevalence in the ‘deep poverty and crowded’ class.

Differences between Risk Profiles in Distal Outcomes

In order to ensure that distal outcome means were estimated based on the 4 risk classes identified at baseline, item probabilities were fixed at values from the 4-class LCA model (Nylund, 2007). Next, each third grade outcome was included in the 4-class model with race/ethnicity as a covariate and outcome means were allowed to vary across classes. The MODEL TEST command was used to assess mean differences using the Wald chi-square test (Muthen & Muthen, 1998–2010).

The means and standard errors for the child outcomes by class are provided in Table 3. To examine the magnitude of the differences, the effect sizes (Cohen’s *d*) for each mean comparison are provided in the table. Because of concerns about power, effect sizes of .20 or higher are interpreted even if the difference does not reach statistical significance. In general, children who experienced ‘low risk’ (1) family settings in pre-school had the higher levels of functioning in third grade than children in the other three classes. Importantly, children who experienced ‘single and stressed’ (3) and ‘deep poverty and crowded’ (4) profiles had the lowest levels of functioning (relative to children in low risk settings) although these patterns varied across outcomes.

Discussion

This study compares cumulative risk and LCA models as two approaches to modeling relationships between poverty, poverty-related risk, and children’s development. Focusing on deep poverty and four poverty-related risks, we used LCA to identify four latent class profiles within our sample of Head Start-enrolled, low-income families. While some of the profiles are intuitive (i.e. low risk), others are less so (i.e. single and stressed, deep poverty and crowded). Results from both cumulative risk and LCA models demonstrate that children exposed to more poverty-related risks in preschool have worse functioning in third grade across multiple domains relative to children with lower levels of risk. However, LCA models also revealed that experiences of deep poverty and poverty-related risks are not uniform across a set of families that would all be identified as “poor”. Moreover, our analyses revealed that particular combinations of risk factors, specifically “non-nuclear” family structure combined with multiple life stressors and experiencing deep poverty while residing in a crowded household, were particularly detrimental for children’s future functioning.

Experiences of Early Deep Poverty and Poverty-Related Risk

It is interesting to note that even within a homogeneously low-income sample (i.e. families had to fall below the federal poverty guidelines in order to qualify for enrollment in Head Start programming) we were able to identify variability in experiences of risk. Similar to the cumulative risk index, whereon 79% of the sample experienced 2 or fewer risks, LCA

revealed that a large proportion of families (47%) fell into a 'low risk' profile, characterized by low response probabilities on most of the risks. However, LCA also revealed three additional profiles; the 'deep poverty and single' (40%) profile, characterized by high probabilities of being in deep poverty and of residing in a single-parent household, the 'single and stressed' (9%) profile, characterized by high probabilities of residing in a single-parent household, experiencing multiple life stressors, and having a caregiver who is depressed, and the 'deep poverty and crowded' (5%) profile, characterized by high probabilities of being in deep poverty and residing in a crowded household.

The patterns of risk experienced by families in this sample support findings from prior work on poverty, poverty-related risk, and children's development. First, the emergence of the 'deep poverty and single' and 'deep poverty and crowded' profiles is not surprising given what we know about the interdependence of poverty and family structure (e.g. Redd et al., 2011) and poverty and residential crowding (e.g. Evans & Saegert, 2000). In addition, the identification of the 'single and stressed' profile fits with theoretical models that emphasize family-level stressors (e.g. psychological distress, parenting strain) as underlying factors in relationships between poverty, family structure, and detriments to children's outcomes (Conger & Elder, 1994; McLoyd, 1990). Finally, in many ways, the latent risk profiles identified in this study parallel those from other studies using LCA to examine risk among families with young children (Lanza et al., 2010; Rhoades et al., 2011). All studies identify low and multi-risk profiles and although there are variations in the other types of risk profiles that emerge, poverty and marital status are consistently identified as salient indicators. Consistencies across studies increase confidence in the generalizability of LCA findings.

Racial/Ethnic Differences in Risk

Given prior work that has shown poverty, poverty-related risks and their relationships to children's outcomes to vary by race/ethnicity (Hatch & Dohrenwend, 2007; Kilmer et al., 1998), it was important to test for differences across racial/ethnic groups. A comparison of the cumulative risk index across racial/ethnic groups revealed that African American families experienced higher rates of risk than Latino/White families. Moreover, tests of measurement invariance across LCA models revealed that although patterns of risk are similar across groups (i.e. risks co-vary in the same way), the prevalence of risk profiles differ. Similar to tests of the cumulative risk index, a higher proportion of Latino/White families (44%) were characterized as being 'low risk' relative to African-American families (33%). However, LCA models also revealed that 44% of African-American families were characterized as being in 'deep poverty and single', while only 16% of the Latino/White families fell into this profile. This finding is not unexpected given that a higher proportion of African-American than Latino children lives in poverty in the United States (Wight et al., 2010) while the share of births to unmarried mothers is higher among African Americans than among Latino women (Hummer & Hamilton, 2010). Finally, a larger proportion of Latino families (28%) were characterized as being in the 'deep poverty and crowded' profiles compared with African American families (13%); this finding parallels prior work that has found rates of residential crowding to be higher among Latinos relative to other racial and ethnic groups (Rossenbaum, 2008). It is interesting to note that although profile

prevalences differed across racial/ethnic groups, item response probabilities did not. This finding suggests that the co-occurrence of risk is not culturally determined and may be driven by structural parameters that affect individuals equally.

A Comparison of Two Analytic Methods

In the last step of our analyses, we examined whether children's academic performance, behavior problems, and self-regulatory skills in third grade varied as a function of children's early exposure to risk accumulation and risk profiles. As expected, the cumulative risk index was associated with children's outcomes in third grade, with increasing risk exposure predicting increasing behavior problems and lower literacy grades. Paralleling the results from the cumulative risk models, children in the 'low risk' profiles had consistently better outcomes relative to children in the other three profiles; children in the 'deep poverty and single' profile had worse performance on 1 of the 6 outcomes (Table 3, 1 v 2), children in the 'single and stressed' profile had worse performance on 4 of the 6 outcomes (Table 3, 1 v 3), and children in the 'deep poverty and crowded' profile had worse performance on 4 of the 6 outcomes (Table 3, 1 v 4). Interestingly, the strength and consistency of these differences varied across profiles and outcomes; children in the 'single and stressed' profile had high levels of internalizing and externalizing problems while children in the 'deep poverty and crowded' profile had low literacy and math grades. It may be that different outcomes are sensitive to specific *combinations* of risk. These results suggest that behavioral and socioemotional skills may be most influenced by single parenthood in the context of family-level stressors while academic performance may suffer when children are exposed to low-resourced, chaotic environments.

In many ways the findings from the cumulative risk and LCA models tell parallel stories; a large number of families experience relatively low levels of risk, Latino/White families face lower levels of risk than African American families, and children facing multiple risks in preschool have lower functioning in third grade relative to lower risk peers. However, in contrast with cumulative risk models, the LCA identifies three distinct risk profiles; families facing deep poverty in combination with single parenthood or a crowded household and highly stressed single-parent families. Although cumulative risk models are powerful in that they provide a general measure of the multiple risks families face, their utility for intervention development can be limited. In these analyses, results from the cumulative risk model would suggest that family-focused interventions should try to reduce the number of risks that families face, regardless of the type or quantity of the risk. In comparison, findings from the LCA indicate that intervention strategies that are more targeted, in terms of whom they provide services to (e.g. highly stressed, single-parent households, families facing deep poverty in combination with structural strains) and the types of services that they provide (e.g. mental health services, access to material supports) may be most effective.

Limitations

There are several limitations to this study that should be mentioned. First, as in any work that examines the co-occurrence of risk, the findings are shaped by the variables that are included in the model. In this study we chose to focus on deep poverty and a small number of family-level, poverty-related risks that have been shown to co-occur with poverty and to

be important determinants of children's development. In no way does this set of risk factors fully capture the spectrum of stressors that many low-income families face. For example, given that Latino/White families are overrepresented in the 'low risk' profile and African American families are overrepresented in the 'deep poverty and single' profile, it may be that differential exposure to other community-level risks such as residential segregation, community violence, and low school quality may underlie relationships between risk profiles and outcomes. Although, the fact that families were purposefully sampled from low-income communities increases our confidence that African American and Latino families faced similar levels of community risk in preschool, future work needs to explore risk at multiple levels (family, school, community) to better understand how ecologies of risk may affect families and children. Moreover, the inclusion of a different set of risks in the LCA or the use of different dichotomizing cut points may shape the number and types of profiles that emerge. Although these findings are specific to this sample and these risk factors, they should also be interpreted within the context of other recent LCA work on family risk and children's outcomes in an effort to build a common understanding of how risks co-occur. Second, these analyses do not capture the temporal relationship between risks. While this type of analysis provides important information about at one point in time, it does not tell us about how early exposure to one type of risk (e.g. deep poverty) may contribute to later exposure to other risks (e.g. depression). Similarly, this analysis does not examine how risk profiles change over time and how individuals may transition between profiles. Future work should capitalize on latent transition methodologies to explore these questions (Collins & Lanza, 2010). In addition, the relationships between early risk profiles and children's outcomes in third grade are not causal. There are various other family or child characteristics related to both early risk profiles and children's outcomes that may be driving these relationships. Therefore, this analysis should be considered an exploration of early risk exposure and children's later functioning.

Despite its limitations, this study makes several important contributions to the field. First, although a comparison of findings from cumulative risk and LCA models revealed many similarities, the LCA also identified three qualitatively distinct risk profiles – families facing deep poverty and single parenthood, highly stressed single-parent households, and families facing deep poverty and a crowded household. Moreover, children living in 'single, stressed' and 'deep poverty, crowded' households in early childhood experienced the largest detriments in later functioning. Understanding how particular *combinations* of risks affect children's development is an important step forward in tailoring effective intervention strategies. Finally, we found that while the prevalence of risk profiles varied across racial/ethnic groups, the patterns of co-occurrence did not, suggesting that families experience the accumulation of risk in similar ways. As a whole, these findings highlight that all risks are not equal and the utility of LCA as a tool for identifying at-risk families with implications for the development of targeted intervention programs.

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Table 1

Correlations between Family Risks and Distal Child Outcomes

		1	2	3	4	5	6	7	8	9	10	11	12	13
Family Risks and Characteristics														
1	Poor	1.00												
2	Single	.05	1.00											
3	Large household	.26**	−.09*	1.00										
4	Depressed	.11**	.04	−.05	1.00									
5	High life stress	−.05	−.05	−.04	.23**	1.00								
6	Cumulative risk	.62**	.45**	.45**	.51**	.36**	1.00							
7	African American	.12**	.16**	−.04	.00	.05	.13**	1.00						
Child Outcomes														
8	Literacy grades	−.14**	.03	−.05	−.04	.01	−.09*	−.08	1.00					
9	Math grades	−.09*	.05	−.03	−.05	.01	−.05	−.09*	.79**	1.00				
10	Internalizing prob.	.04	.00	−.08	.16**	.20**	.12**	.04	−.21**	−.19**	1.00			
11	Externalizing prob.	.03	.06	−.01	.18**	.16**	.17**	.15**	−.29**	−.28**	.75**	1.00		
12	Cognitive dysreg.	.10*	−.04	.02	.02	−.02	.04	.06	−.66**	−.60**	.26**	.33**	1.00	
13	Behavioral dysreg.	.05	.03	−.01	.08	−.04	.05	.11**	−.44**	−.37**	.22**	.38**	.66**	1.00

* < .05,

** < .01

NOTE: N=576

Table 2

Four-Latent-Class Model of Family Risk

	1	2	3	4
Assigned label	**Low Risk**	**Deep Poverty, Single**	**Single, Stressed**	**Deep Poverty, Crowded**
Probability of membership				
	47%	40%	9%	5%
Conditional probability of presence in household				
Poor	.01	**.91**	.29	**.89**
Single	**.57**	**.70**	**.67**	.00
Large household	.12	.33	.00	**.91**
Depressed	.10	.25	**.85**	.08
High life stress	.10	.06	**.85**	.35

[†]Conditional probabilities > .5 in bold to facilitate interpretation

Table 3

Distal Child Outcome Means and Standard Errors by Latent Risk Class

	1	2	3	4						
	Low Risk	**Deep Poverty, Single**	**Single, Stressed**	**Deep Poverty, Crowded**	**1v2**	**1v3**	**1v4**	**2v3**	**2v4**	**3v4**
Literacy Grades	3.66	3.27	3.40	3.09	**		*			
	.10	.10	.18	.28	**.27**	.19	**.37**	.08	.11	.18
Math Grades	3.56	3.30	3.23	3.02	†					
	.11	.11	.24	.31	.16	**.20**	**.32**	.04	.16	.10
Internalizing	.26	.26	.75	.35		**		**		**
Problems	.02	.02	.12	.08	.01	**.93**	**.25**	**.90**	**.22**	**.48**
Externalizing	.34	.38	.88	.39		*		†		†
Problems	.03	.03	.25	.11	.07	**.54**	.10	**.50**	.03	**.31**
Cognitive	.35	.40	.42	.45						
Dysregulation	.02	.02	.06	.07	.13	.18	**.24**	.06	.11	.02
Behavioral	.28	.34	.38	.26						
Dysregulation	.02	.03	.08	.06	.14	**.23**	.06	.09	.18	**.22**

Note: Higher values indicate more positive outcomes for grades but more negative outcomes for the other measures.

t < .01,

* < .05,

** < .01

† Effect sizes (*d*) are provided for each mean difference; values > = .20 are bolded for interprretation.