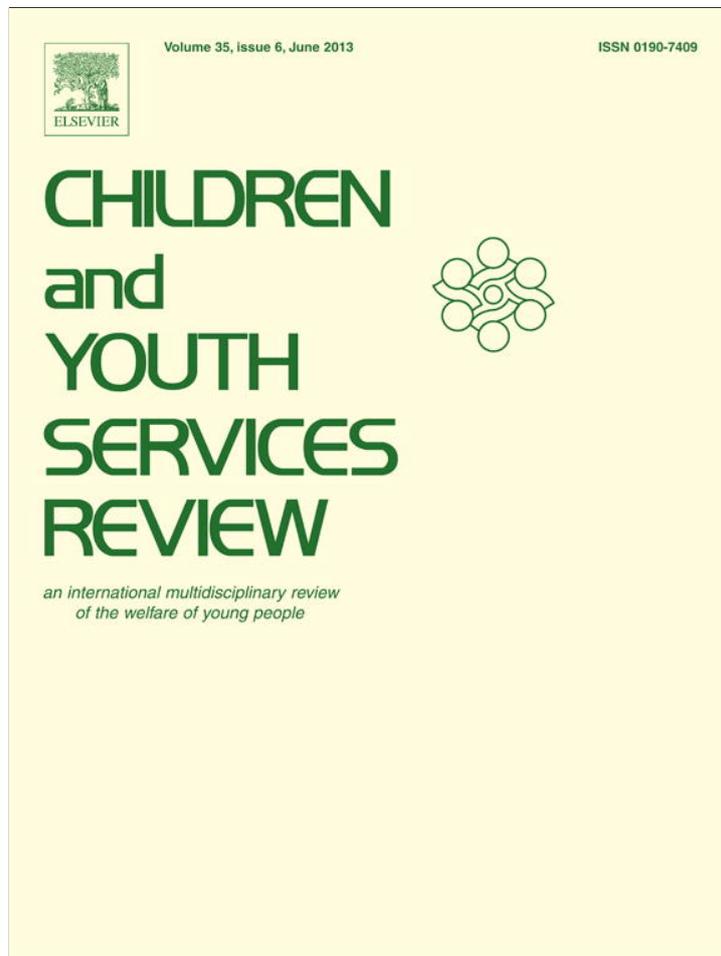


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A population-based inquiry of homeless episode characteristics and early educational well-being



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ABSTRACT

Child homelessness and educational well-being is an area of national research that requires more precise investigation to address mixed findings. The aim of this study was to extend the investigation of the relations between homelessness and educational well-being by determining if timing and frequency of homeless episodes are differentially associated with children's academic and classroom engagement outcomes. This investigation used a comprehensive research model to study the effects of these homeless episode characteristics within a large urban student cohort. Additionally, this study accounted for co-occurring early risk factors. Findings indicated that having a first homeless episode in early childhood was associated with non-proficiency in mathematics and academic engagement problems. Also more frequent homeless episodes were related to truancy in third grade. These results stress the importance of early intervention for homeless children and underscore the need to further understand the variation in young children's homeless experiences.

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1. Introduction

Research commissioned by the U.S. Department of Education and the U.S. Department of Health and Human Services reports that child and family homelessness is a growing, national problem (Rog, Holupka, & Patton, 2007; U.S. Department of Education, 2011). Families with children, particularly children under the age of six, represent one of the fastest growing segments of the homeless population and now comprise 34% of the population experiencing homelessness (Rog et al., 2007). Local education agencies in the United States reported that over a million students were homeless in 2011, the highest levels of recorded homelessness (National Center for Homeless Education, 2012). This rising prevalence of homelessness among students, particularly young students, has pointed to the need to better understand how these experiences are related to multiple domains of educational well-being.

Children with homeless experiences are a difficult population to research, given their residential instability. Therefore, research on homeless students has, by necessity, been predominantly a study of children using emergency housing services, an established and stable service for homeless families. Comprehensive reviews of this body of research reveal mixed educational outcomes associated with experiences of homelessness (Buckner, 2008; Miller, 2011; Rog et al., 2007). Many studies have identified that homelessness translates into significantly

worse academic performance (Masten, Miliotis, Graham-Bermann, Ramirez, & Neemann, 1993; Masten et al., 1997; Zima, Wells, & Freeman, 1994), and increased number of absences from school (Zima et al., 1994). However, other research shows no or only short-term relations to academic underperformance (Buckner, Bassuk, & Weinreb, 2001; Rafferty, Shinn, & Weitzman, 2004). Some research found little evidence of significant behavioral and mental health differences between children experiencing homelessness and their low-income housed peers (Masten et al., 1993; Schteingart, Molnar, Klein, Lowe, & Hartmann, 1995), while other work has demonstrated significant differences in behavior problems when comparing children with homeless experiences and housed children (Bassuk, Weinreb, Dawson, Perloff, & Buckner, 1997; Rescorla, Parker, & Stolley, 1991). These opposing findings call into question the definitive associations between these experiences and children's academic and behavioral outcomes.

Reviews of research on student homelessness have identified an explanation for these mixed findings (Buckner, 2008; Miller, 2011). Studies using convenience samples from select emergency housing shelters within a particular geographic location result in sub-populations that are more alike in terms of the demographic characteristics and the contextual characteristics of that environment (Buckner, 2012). Meaning that convenience sampling of families from a single shelter (e.g., Masten et al., 1997) or a few shelters within a large, diverse geographic area (e.g., 3 shelters in New York City — Rubin et al., 1996) cannot adequately generalize to the wide variability of homeless experiences within a population. It follows that this method of sampling within a particular location limits the ability to generalize the findings of these studies to the experiences of all

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homeless students (Buckner, 2012). Also, small sample sizes in several studies inhibit researchers' ability to detect significant differences. Detecting small effects, which can still be policy relevant, requires a sufficiently large sample to conduct nuanced inquiry. As a result, large population-based studies are needed to have the sufficient sample size and representativeness to conduct more precise research in relation to these early emergency housing experiences.

A majority of these studies have also failed to consider the variation among children living in poverty that may affect the association between homelessness and early educational well-being. Children coming from low-income families are especially vulnerable to periods of homelessness due to limited resources available during difficult economic periods (Miller, 2011). Attempts to investigate how the poverty status of homeless children relates to educational outcomes have resulted in inconclusive findings. Several of these studies have found that little or no difference exists between low-income housed children and low-income homeless students (Buckner et al., 2001; Schteingart et al., 1995; Ziesemer, Marcoux, & Manvell, 1994). In contrast, other studies have shown significant differences in outcomes when comparing homeless children to their low-income peers or when controlling for poverty (Menke & Wagner, 1997; Rescorla et al., 1991; Rubin et al., 1996). These findings continue to illustrate the mixed results found in this research literature and call for a closer scrutiny of the many distinct risks experienced by homeless families, since a simple low-income designation masks the variability of risk factors for families living in poverty.

As Huston and Bentley (2010) have indicated, poverty is associated with a complex web of specific disadvantages (e.g., poor housing, health, and education) that over time significantly impact children's opportunities to develop and achieve. Few studies on young children experiencing homelessness have included other early social and biological risks known to impact learning when predicting children's educational outcomes. For instance, biological birth risks such as a low birth weight or inadequate prenatal care are associated with a range of poor behavioral and academic outcomes in school (Fantuzzo & Perlman, 2007; Fantuzzo, Perlman, & Dobbins, 2011). These risks are also disproportionately prevalent among students experiencing homelessness (Rouse, Fantuzzo, & LeBoeuf, 2011). It follows then that one of the most difficult tasks facing the field of research on homelessness lies in disentangling the *unique* contributions of being homeless to outcomes, above and beyond these other significant and detrimental experiences hindering well-being (Miller, 2011).

The limitations of the previous research on child homelessness highlight the complexities of studying these early experiences. In his review of the literature on homelessness, Miller (2011) argues that the field needs to take a *holistic* evaluation of homeless student's outcomes. He calls for a thorough analysis of multiple systems of service use and risk factors of homeless children to inform our understanding of the complex experiences of this population. To accomplish this, research needs to more precisely identify the unique contributions of early experiences of homelessness using a comprehensive, conceptual framework incorporating multiple risks that influence children's well-being. This requires an advanced methodological approach that will allow researchers to capture the variability of risk factors for an entire population of homeless children.

A developmental-ecological model, which embodies a holistic approach to understanding the complex transactions of person, context and time, can provide a useful framework to guide the study of the relations between child homelessness and educational outcomes (Bronfenbrenner, 2005). This model recognizes that each child has a unique set of characteristics and experiences that transact with the environment. It stresses that individual characteristics of children (e.g., race and biological birth risks) and the context of early risk factors in proximal systems (e.g., the family) are essential to consider when studying the effects of homelessness on educational outcomes. Moreover, this model acknowledges that young vulnerable children can

experience multiple co-occurring risks and the variability of these risk factors can differentially affect their developmental trajectory across multiple domains of ability. It is therefore essential to identify exposure to these risks to isolate the influence of any one risk factor. In conjunction with accounting for the interaction between the person and context, it is also necessary to study the influence of time. Since this model identifies development as cumulative and progressive, it is important to note *when* and *how often* children experience risks in the course of their development.

To study the complex nature of child homelessness, large and representative samples are needed with data from the multiple systems that monitor risk factors and well-being. Recent advances have begun to facilitate the development of research tools necessary to adequately address this need to understand the complexity of co-occurring social problems (Culhane, Fantuzzo, Rouse, Tam, & Lukens, 2010). As Miller (2011) notes, "there is a general dearth of district- and/or citywide infrastructures that integrate these (and other) formal and informal data in pragmatic, policy-informing manners." (pp. 328). However, in several states and municipalities in the United States, Integrated Data Systems (IDS) that link school and social service data are now being employed to address complex social policy questions (Duran, Wilson, & Carroll, 2005; Hotz, Goerge, Balzekas, & Margolin, 1998; Walker, Farley, & Polin, 2012). IDS therefore provide the capacity for researchers and policy makers to longitudinally assess multiple systems influencing the well-being of a population of homeless children. This enables inquiry involving not only multiple systems but also the important component of experience in relation to time.

A few recent studies have addressed the relations between homelessness and educational well-being guided by a holistic, developmental framework and through the use of comprehensive integrated data systems that allow the study of homelessness in a multiple-risk context within a population of children (Obradović et al., 2009; Perlman & Fantuzzo, 2010; Rouse & Fantuzzo, 2009). These efforts have advanced the study of the unique associations between being homeless and later educational well-being by investigating homelessness in a well-defined population of children and by accounting for both important individual differences and multiple risk factors. They are, however, limited in their ability to specifically capture the variability of the children's homelessness experiences since they only investigated the *dichotomous* presence of homelessness or addressed only one characteristic of homeless experiences.

To date, no study in the body of homelessness literature has concurrently assessed the relations between multiple characteristics of homeless experiences and educational well-being within a population of children while controlling for the variability of multiple risks. The purpose of the current study was to contribute to population-based investigations of homelessness and educational outcomes by accounting for: (1) the variance between children experiencing multiple distinct risks in addition to homelessness, (2) the variability of homeless characteristics that more accurately differentiates the nature of the homeless experience, and (3) the differential association between homeless experiences and multiple academic and behavioral educational outcomes. To achieve this aim, the present study addressed three primary research questions:

- 1) What is the prevalence of risk factors among children with a history of homelessness compared to children who were never homeless in an entire cohort of third-graders?
- 2) Among the subpopulation of children who were homeless, what is the distribution of homeless episode characteristics including age of first homeless episode and frequency of homeless episodes?
- 3) Do these homeless episode characteristics relate to indicators of educational well-being including classroom engagement problems, poor academic achievement, and truancy in third grade after accounting for other demographic characteristics and risk factors?

2. Method

2.1. Participants

This study used an existing integrated database containing multi-service information on a cohort of third grade students in 2005–2006 ($n = 10,639$). Multiple public service records, including records from the School District, Department of Public Health, and Department of Human Services, were combined for each child born and still living in Philadelphia in third grade. The sample was composed of 66% African American, 14% White, 14% Hispanic, and 5% other race/ethnicity students. Approximately half of the sample was male. Sixty-nine percent of the students received free and reduced lunch between the first and the third grade. Table 1 provides a breakdown of demographic information for the study sample and the subpopulation of children who experienced homelessness (9.8% of the overall study cohort). Children with a homeless experience were disproportionately African American (92.7%) and eligible for free or reduced lunch (85.3%).

2.2. Measures

2.2.1. Timing of first homeless episode

The timing of first homeless episode was calculated using the difference between the child's birthdate and the first date on which the family entered emergency housing during the child's life. This difference represented the child's age during his or her first emergency housing experience. This variable was transformed to indicate critical developmental periods for the timing of first homeless episode. The timing of first homeless episode was labeled as either happening in Infancy (0–1 years of age), Toddlerhood (1–3 years of age), Pre-kindergarten (3–5 years of age), or Elementary school (greater than 5 years of age).

2.2.2. Frequency of homeless episodes

The number of distinct emergency housing episodes was recorded for each child from birth to third grade. These episodes were then summed and the resulting number of homeless episodes ranged from one to seven. However this count-based distribution was recoded for analytic purposes into three groups to accommodate the positively skewed distribution. A frequency variable was created for each child indicating an experience of one, two, or three or more episodes.

2.2.3. Reading and mathematics non-proficiency

Reading and mathematics non-proficiency was assessed using the Pennsylvania System of School Assessment, a criterion referenced test used for performance assessment in Pennsylvania (PSSA; Pennsylvania Department of Education, 2012). The PSSA is administered for the first time to third grade students at the end of the year. The reading scale measures critical reading skills, such as finding the main idea, drawing conclusions, and making inferences, in addition to vocabulary assessment. The mathematics scale measures fundamental mathematics computations, including addition, subtraction, multiplication, division, fractions, and concepts like length weight, time and geometry. The mathematics scales also apply math concepts and computation problems through

Table 1
Demographic characteristics of the study cohort and homeless subpopulation.

	Study cohort ($n = 10,639$)	Homeless subpopulation ($n = 1038$)
Child characteristics		
Sex (male)	49.3	46.5
African American	66.6	92.7
White	14.2	3.0
Hispanic	14.3	3.8
Asian/other	4.8	0.6
Free or reduced lunch	69.0	85.3

open ended questions. Reliability and validity for the PSSA with the Pennsylvania population are well established with internal consistency estimates, and documentation for content and construct validity (Pennsylvania Department of Education, 2012). For this study, the policy relevant achievement of academic proficiency in math and reading was used as primary achievement outcomes. These outcomes were separately dummy-coded as 1 if the child failed to reach proficiency.

2.2.4. Truancy

Truancy was determined through school district records. Consistent with school district policy, a child was considered truant from school if they had 8 or more unexcused absences during their third-grade school year.

2.2.5. Classroom engagement problems

Classroom engagement problems were assessed with the Problems in Classroom Engagement Scale (PCES; Fantuzzo, Li, LeBoeuf, Barghaus, & Rouse, submitted for publication). PCES is a 14-item checklist designed to identify children's task and social problem behaviors during routine classroom situations in elementary school settings. The PCES has two dimensions empirically derived through factor analytic methods, comprising academic engagement and social engagement problems. For multiple salient behaviors, teachers indicate whether or not the child needs improvement. Ratings are recorded three times per academic year during the first, second, and third grades. Academic engagement in the classroom, which requires attention and inhibitory control, requires competencies similar to other measures of self-regulation (Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009). Sample items for academic engagement problems include not demonstrating consistent effort and difficulty working independently. The social engagement problems dimension includes items such as uncooperative with teachers and peers and difficulty following classroom rules. Students were categorized as having problems for each dimension if teachers documented they needed improvement on at least one of the seven items for each respective dimension.

2.2.6. Free or reduced lunch

School district records indicated whether the students were eligible for the free or reduced lunch program. This was based on participation in the federal Temporary Assistance for Needy Families (TANF) program as well as eligibility based on parental income level. This was coded as 1 if the child received free or reduced lunch between the first and the third grade.

2.2.7. Inadequate prenatal care

Birth records were obtained through the Department of Public Health (DPH) and indicated if the child received no prenatal care, prenatal care only in the third trimester or fewer than four prenatal visits during pregnancy. A code of 1 indicated the child received inadequate care.

2.2.8. Preterm/low birth weight

DPH records also indicated if a child was born premature (less than 36 weeks gestation) or had a low birth weight (less than 2.5 kg). A code of 1 indicated a child was born preterm or had a low birth weight.

2.2.9. Child maltreatment

Information on child maltreatment was provided by the Department of Human Services for any substantiated allegation of child maltreatment. Each allegation of child maltreatment was investigated, and evidence was gathered to support any claim of a threat to a child's well-being. Categories of maltreatment included neglect, physical abuse, and sexual abuse. A binary variable was created with the value of 1 representing any presence of a substantiated claim between birth and third grade.

2.3. Procedures

This study utilized an existing integrated data system: the Kids Integrated Data System (KIDS). KIDS is one of the nation's most comprehensive integrated data systems designed to study the intersection of policy relevant outcomes and social services provided to children. KIDS staff uses state-of-the-art data management and data integration procedures to compile complete integrated datasets for research projects. Systematic auditing of data is undertaken to satisfy data quality standards. Record matching algorithms using deterministic and probabilistic linking methods are employed to instill confidence in accurate record integration. Identifying information, utilized in linking, is then removed from the database to ensure privacy and confidentiality. The dataset analyzed in this study was stripped of all identifying information before being provided to the researchers and retained only key variables of interest for the current study.

2.4. Data analysis

Descriptive analyses were conducted to determine the prevalence of risk for both the general student population and the subset experiencing homelessness. Within this subset of students, further analyses provided a summary picture of the timing of first homeless experience and frequency of homeless episodes. To estimate associations between characteristics of homelessness and the primary outcomes of interest while accounting for the nesting of students within schools, multilevel logistic models were specified using SAS software (SAS Institute Inc., 2008). Logistic models were employed as all outcomes of interest were binary in nature. Predictors in each model included the dummy coding of timing and frequency of homeless episodes, gender, free or reduced lunch status, and early risk factors including inadequate prenatal care, preterm/low birth weight, and child maltreatment. Because 93% of the homeless population was African American (see Table 1), race/ethnicity was not included as a covariate in the analyses. The resulting models then produced odds ratios – estimates of the increased or decreased odds of an outcome for the group of interest in relation to the reference group. In the current study, models were estimated for outcomes including reading and mathematics non-proficiency, academic engagement problems, social engagement problems, and truancy.

3. Results

3.1. Prevalence of risk factors and distribution of homeless episode characteristics

The prevalence rates of risk factors for the overall study cohort and the subpopulation of homeless students are presented in Table 2. 9.8% of children with a homeless experience had higher prevalence rates for all four risk factors – free and reduced lunch status, inadequate prenatal care, preterm/low birth weight, and child maltreatment. Most notably, twenty-nine percent of homeless children experienced child maltreatment as compared with only 10.9% of the overall cohort. Table 3 shows the distribution of homeless episode characteristics within the subpopulation of homeless children. The largest percentage of children (32.6%) experienced their first episode of homelessness during infancy. The percentage of children experiencing homelessness

Table 2
Prevalence of risk factors for the study cohort and homeless subpopulation.

	Study cohort	Homeless subpopulation
Risk factor (%)		
Inadequate prenatal care	34.4	51.8
Preterm/low birth weight	20.9	22.7
Child maltreatment	10.9	29.2

Table 3
Distribution of homeless episode characteristics.

Homeless episode characteristics (%)	Homeless subpopulation
Timing of first episode	
Infancy	32.6
Toddlerhood	25.4
Pre-kindergarten	16.4
Elementary school	25.6
Frequency of episodes	
One	70.2
Two	18.7
Three or more	11.1

for the first time decreased from infancy to 16.4% in pre-kindergarten and then increased again to 25.6% in elementary school. The majority of homeless children (70.2%) experienced only 1 homeless episode with 11.1% experiencing 3 or more episodes.

3.2. Homeless episode characteristics and third-grade educational well-being

Multilevel logistic regression models were estimated to determine the increased or decreased odds of a poor educational outcome associated with each homeless episode characteristic, after controlling for demographic and risk characteristics. Results for reading and mathematics non-proficiency are presented in Table 4. Children who had their first homeless episode in toddlerhood had a 60% increase in odds of not meeting proficiency in mathematics as compared to children who first experienced homelessness in elementary school (Odds Ratio = 1.60, $p < .01$). The timing of the first homeless episode was not significantly related to an increase in the odds of reading non-proficiency. The frequency of homeless episodes was not significantly related to either reading or math non-proficiency.

Results for academic and social engagement problems and truancy are presented in Table 5. As with mathematics non-proficiency, experiencing the first homeless episode early in life was related to poor academic engagement, after controlling for demographic and risk characteristics. Specifically, children with their first homeless episode in infancy had a 46% increase in the odds of academic engagement problems

Table 4
Multilevel logistic regression results for homeless episode characteristics and reading and mathematics non-proficiency.

	Reading non-proficiency			Mathematics non-proficiency		
	Log Odds	SE	OR	Log Odds	SE	OR
Demographic and risk covariates						
Gender (males)	.343*	.154	1.41	-.142**	.145	0.87
Free or reduced lunch	.736***	.212	2.09	.514**	.185	1.67
Inadequate prenatal care	.165	.153	1.18	.300*	.146	1.35
Preterm/low birth weight	.152	.189	1.16	.113	.176	1.12
Child maltreatment	.388**	.155	1.48	.175	.146	1.19
Homeless episode characteristics						
Timing of first episode						
Infancy	.254	.204	1.29	.280	.197	1.32
Toddlerhood	.376	.214	1.46	.470**	.132	1.60
Pre-kindergarten	.477	.245	1.61	.223	.229	1.25
Frequency of episodes						
Two	.104	.200	1.11	.019	.187	1.02
Three or more	-.034	.250	0.97	.183	.144	1.20
School intercept variance		.272*			.357*	

Note: Random intercept, Bernoulli. SE = Standard Error. OR = Odds Ratio. Reference group for male is female. Reference group for timing of first episode is elementary school. Reference group for frequency of episodes is one episode.

* $p < .05$.
 ** $p < .01$.
 *** $p < .001$.

Table 5
Multilevel logistic regression results for homeless episode characteristics and engagement problems and truancy.

	Academic engagement problems			Social engagement problems			Truant (8 + unexcused absences)		
	Log Odds	SE	OR	Log Odds	SE	OR	Log Odds	SE	OR
Demographic and risk covariates									
Gender (males)	.942***	.149	1.04	.946**	.267	2.57	-.108	.139	0.90
Free or reduced lunch	.250	.214	2.22	.250	.215	1.28	.999***	.108	3.19
Inadequate prenatal care	-.132	.145	1.18	-.135	.148	0.87	.153	.141	1.17
Preterm/low birth weight	.172	.174	0.95	.172	.175	1.19	-.226	.169	1.07
Child maltreatment	.405**	.146	1.83	.406**	.146	1.50	.235	.140	1.27
Homeless episode characteristics									
Timing of first episode									
Infancy	.378*	.167	1.46	.354	.196	1.42	-.297	.188	0.74
Toddlerhood	.169	.204	1.39	.167	.204	1.18	-.219	.197	0.80
Pre-kindergarten	.025	.227	0.45	.022	.228	1.02	.041	.222	1.04
Frequency of episodes									
Two	.176	.185	1.18	.178	.186	1.19	.270*	.148	1.31
Three or more	.110	.240	0.95	.111	.241	1.12	.411**	.113	1.51
School intercept variance		.250*			.279*			.490**	

Note: Random intercept, Bernoulli. SE = Standard Error. OR = Odds Ratio. Reference group for male is female. Reference group for timing of first episode is elementary school. Reference group for frequency of episodes is one episode.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

(Odds Ratio = 1.46, $p < .05$). The timing of the first homeless episode was not associated with an increase in the likelihood of social engagement problems or truancy in third grade. The frequency of homeless episodes was significantly related to truancy but not academic or social engagement problems. The odds of truancy in third grade were 1.31 times higher for children with two homeless episodes as compared to children with only one homeless episode ($p < .05$). While these odds increased with three or more homeless episodes (Odds Ratio = 1.51, $p < .01$), there was no significant difference when comparing two homeless episodes to three or more homeless episodes.

4. Discussion

The aim of the present study was to extend the investigation of the relations between experiences of homelessness and educational well-being by examining how timing of first experience and frequency of homeless episodes are differentially associated with children's academic and behavioral outcomes. This investigation is the first to use a comprehensive research design to study the effects of multiple characteristics of child homelessness within a student population cohort in a large urban setting. To study the relations between these event characteristics and educational outcomes, an established integrated data system was used to identify timing and frequency of homeless experiences in a third-grade cohort of students and to account for multiple early risks associated with homelessness.

Results on the timing of the first homeless episode indicated that homeless experiences in early childhood were related to an increased likelihood of worse outcomes, relative to experiences of homelessness later in childhood. Specifically, experiences of homelessness in infancy were uniquely related to the lower levels of classroom academic engagement, and first occurrence of homelessness in toddlerhood was associated with higher rates of non-proficiency in mathematics. These results can be interpreted in the framework of the developmental-ecological model (Bronfenbrenner, 2005) which posits that adverse events experienced in early childhood can inhibit the development of basic skills necessary for the development of later school competencies. Establishing inner control or self-regulation is a competency that begins developing in the first years of life and is necessary for later classroom academic engagement and mathematics skills (Eisenberg, Spinrad, & Eggum, 2010; Liew, 2012). The problem-solving process important for learning mathematics, as opposed to reading, specifically requires a distinctive coordination of working memory, attention shifting, and inhibitory control (Blair & Razza, 2007; Brock, Rimm-Kaufman, Nathanson, &

Grimm, 2009). Self-regulation, which includes the ability to activate or inhibit behavioral tendencies through the shifting and focusing of attention, is then important for this later academic competency in math. Research has demonstrated that self-regulatory competencies are also linked to successful classroom behavioral engagement during early formal schooling (Fredricks, Blumenfeld, & Paris, 2004; Liew, 2012; Raver & Knitzer, 2002). These studies illustrate that there is a growing body of research that supports the unique relations between self-regulation skills and success in mathematics for young students.

Moreover, research has shown that children who experience inconsistent or adverse environmental conditions early in life, like homelessness, are more likely to have difficulty developing self-regulation skills (Blair & Raver, 2012; Nigg, 2006). Supporting this, Fantuzzo et al. (2011) found that children who were maltreated before kindergarten evidenced lower classroom engagement and mathematics skills than non-maltreated peers later in school. Findings from the current study suggest that an emergency housing experience in infancy and toddlerhood represents a disruption in the early home environment that may adversely affect the development of self-regulation in early stages of development as evident by later problems with academic engagement in school. Given that over 58% of the children in the study sample had their first emergency housing episode in the first three years of life, this finding indicates that these types of threats to early development and education well-being are occurring for a majority of homeless children. Future research should directly explore the relations between homelessness in infancy and toddlerhood and the development of self-regulation through research designs that can assess the change in self-regulation longitudinally over time.

While homelessness early in life related to significant delays in academic engagement and mathematics proficiency, frequent homeless episodes through the primary school years uniquely related to truancy in the third grade. These results indicate that the transient nature of multiple homeless episodes creates similarly transient experiences in school, as indicated by truancy in this study. Children with more than one homeless episode were upwards of 31% more likely than students with only one homeless episode to meet the school district's definition of truancy (i.e., having at least eight unexcused absences). The findings from this study provide evidence for the disruptive consequences of numerous homeless experiences (i.e., unwanted transitions) on a family's ability to provide their children with regular and dependable means of getting to school. These results are of great concern as research has shown that young children's well-being is dependent on stable and consistent environments, and stressful experiences and

instability can have lasting associations to later educational well-being (Blair & Raver, 2012; Cavanagh & Huston, 2006).

The present study is the first in the literature on homelessness to simultaneously include distinct characteristics of homeless episodes and find differential relations between these event characteristics and multiple educational outcomes. As such, this initial study has some notable limitations which have implications for future research to further advance our understanding of the educational well-being of homeless children. First, the present study used data from the municipality's Homeless Management Information System (U.S. Government & Culhane, 2004). Data from emergency housing services was used because it is the only source of data that has met national auditing requirements for inclusion in the Annual Homeless Assessment Report (U.S. Department of Housing and Urban Development, 2011). However, while these data on emergency housing utilization have met national standards, they do not currently include other forms of housing instability like families in transitional housing or families identified by school districts required to record reports of child and youth homelessness using the Department of Education's definition of homelessness. The Department of Education's definition includes children who are living "doubled-up" with relatives/friends, in hotels or motels; however, children are not systematically monitored and many families remain unaccounted for in the definition of "doubled-up" (Miller, 2011). Currently there is no research or empirical audit of these additional sentinel systems for documenting child homelessness. Future research is needed to validate these other sources of detecting child homelessness to expand the scientifically credible national surveillance system for investigating child homelessness.

Also, though this study included homelessness and other risk data from birth through third grade, it was limited in assessing educational outcomes only at one point in time. Future research should use a longitudinal design that assesses educational outcomes at multiple times over the course of children's prekindergarten through elementary school experience to increase our understanding of the influence of homelessness on early educational trajectories. Following a student population cohort through school would allow for the investigation of the mediating role of various domains of well-being (e.g., academic engagement or truancy) for later educational outcomes. For example, truancy has been shown to mediate the relations between homeless experiences and early classroom engagement skills (Fantuzzo, LeBoeuf, Chen, Rouse, & Culhane, 2012). It is possible that truancy also functions as a mediator between the unwanted transitions of multiple homeless experiences and the trajectory of educational outcomes. In addition, our findings highlight similar relations between timing of the first homeless episode and both academic engagement and math achievement. A study that examines multiple time points can test whether early experiences of homelessness first influence academic engagement, which in turn may drive later academic difficulties. Since attention control and engagement are important for later mathematics skills (Brock et al., 2009; Welsh, Nix, Blair, Bierman, & Nelson, 2010), these findings for math and academic engagement are interrelated. Future research should explore potential mediating roles that early skill deficits may have for later educational well-being.

The findings from the current study were consistent with a small group of studies that represents an initial effort to account for the complex nature of early homeless experiences by controlling for the multiple risks disproportionately experienced by this population. However, the present research used integrated administrative records that only capture publically monitored risks to child development but did not include data on potential protective factors (e.g., early care and education services). Future research should extend our understanding of the early experiences of homeless children by examining the nature and benefit of specific early intervention services received by homeless children to combat the effects of the multiple co-occurring risks they experience. The McKinney-Vento Homeless Assistance Act (1987), which addresses the educational needs of children

and youth experiencing homelessness, mandates that young children experiencing homelessness be prioritized for early intervention and early childhood education services. The present study's findings on the influence of homelessness in the first years of life on early educational well-being emphasize the importance of connecting these vulnerable young children to early intervention and high quality early childhood education experiences (Willard & Perlman, 2012).

Future research should also focus on the types and timing of other social system's involvement for young children experiencing homelessness. Findings from the present study demonstrate that young children experiencing homelessness are disproportionately more likely than their peers to experience other risks, including child maltreatment and birth risks. Understanding the types and sequencing of risk factors would provide insight into what types of interventions are needed – and when to strategically implement them (Fantuzzo, LeBoeuf, Rouse, & Chen, 2012). The present study underscores the value of a developmental-ecological model to guide more holistic research on how distinctive homeless experiences relate to multiple educational outcomes. It also demonstrates how established integrated data systems for a municipality can provide the research capacities to use such comprehensive and holistic models to deepen our understanding of the educational well-being of young children experiencing homelessness.

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References

- Bassuk, E., Weinreb, L., Dawson, R., Perloff, J., & Buckner, J. (1997). Determinants of behavior in homeless and low-income housed preschool children. *Pediatrics*, *100*(1), 92–100.
- Blair, C., & Raver, C. C. (2012). Individual development and evolution: Experiential canalization of self-regulation. *Developmental Psychology*, *48*, 647–657.
- Blair, C., & Razza, R. P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Development*, *78*, 647–663. <http://dx.doi.org/10.1111/j.1467-8624.2007.01019.x>.
- Brock, L. L., Rimm-Kaufman, S. E., Nathanson, L., & Grimm, K. J. (2009). The contributions of 'hot' and 'cool' executive function to children's academic achievement, learning-related behaviors, and engagement in kindergarten. *Early Childhood Research Quarterly*, *24*, 337–349.
- Bronfenbrenner, U. (2005). *Making human beings human: Bioecological perspectives on human development*. Thousand Oaks, CA: Sage Publications.
- Buckner, J. C. (2008). Understanding the impact of homelessness on children: Challenges and future research directions. *American Behavioral Scientist*, *51*, 721–736.
- Buckner, J. C. (2012). Education research on homeless and housed children living in poverty: Comments on Masten, Fantuzzo, Herbers, and Voight. *Educational Researcher*, *41*, 403–407.
- Buckner, J. C., Bassuk, E. L., & Weinreb, L. F. (2001). Predictors of academic achievement among homeless and low-income housed children. *Journal of School Psychology*, *39*, 45–69. [http://dx.doi.org/10.1016/S0022-4405\(00\)00059-5](http://dx.doi.org/10.1016/S0022-4405(00)00059-5).
- Cavanagh, S. E., & Huston, A. C. (2006). Family instability and children's early problem behavior. *Social Forces*, *85*(1), 551–581. <http://dx.doi.org/10.1353/sof.2006.0120>.
- Culhane, D., Fantuzzo, J., Rouse, H., Tam, V., & Lukens, J. (2010). *Connecting the dots: The promise of integrated data systems for policy analysis and systems reform*. Intelligence for Social Policy (Retrieved November 20, 2012 from: http://works.bepress.com/dennis_culhane/90)
- Duran, F., Wilson, S., & Carroll, D. (2005). *Putting administrative data to work: A toolkit for state agencies on advancing data integration and data sharing efforts to support sound policy and program development*. Farmington, CT: Early Childhood Data CONNECTIONS, Child Health and Development Institute of Connecticut (Retrieved November 20, 2012 from <http://www.plan4preschool.org/documents/admin-toolkit.pdf>)
- Eisenberg, N., Spinrad, T. L., & Eggum, N. D. (2010). Emotion-related self-regulation and its relation to children's maladjustment. *Annual Review of Clinical Psychology*, *6*, 495–525. <http://dx.doi.org/10.1146/annurev.clinpsy.121208.131208>.
- Fantuzzo, J., LeBoeuf, W., Chen, C., Rouse, H., & Culhane, D. (2012). The unique and combined effects of homelessness and social mobility on the educational outcomes of young children. *Educational Researcher*, *41*, 393–402.

- Fantuzzo, J., LeBoeuf, W., Rouse, H., & Chen, C. (2012). Academic achievement of African American boys: A city-wide, community-based investigation of risk and resilience. *Journal of School Psychology, 50*, 559–579.
- Fantuzzo, J., Li, F., LeBoeuf, W., Barghaus, K., & Rouse, H. (submitted for publication). Problems in classroom engagement scale: Validation of a district-wide longitudinal measure used across primary grades.
- Fantuzzo, J., & Perlman, S. (2007). The unique impact of out-of-home placement and the mediating effects of child maltreatment and homelessness on early school success. *Children and Youth Services Review, 29*, 941–960.
- Fantuzzo, J. W., Perlman, S. M., & Dobbins, E. K. (2011). Types and timing of child maltreatment and early school success: A population-based investigation. *Children and Youth Services Review, 33*(8), 1404–1411. <http://dx.doi.org/10.1016/j.chilyouth.2011.04.010>.
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*(1), 59–109. <http://dx.doi.org/10.3102/00346543074001059>.
- Hotz, V. J., Goerge, R., Balzekas, J., & Margolin, F. (1998). Administrative data for policy-relevant research: Assessment of current utility and recommendations for development. *Advisory panel on research uses of administrative data of the Northwestern University/University of Chicago Joint Center for Poverty Research* (Retrieved November 20, 2012 http://www.ipr.northwestern.edu/jcpr/workingpapers/wpfiles/AdminData_Summary.pdf)
- Huston, A., & Bentley, A. (2010). Human development in societal context. *Annual Review of Psychology, 61*, 411–437.
- Liew, J. (2012). Effortful control, executive functions, and education: Bringing self-regulatory and social-emotional competencies to the table. *Child Development Perspectives, 6*(2), 105–111. <http://dx.doi.org/10.1111/j.1750-8606.2011.00196.x>.
- Masten, A. S., Miliotis, D., Graham-Bermann, S., Ramirez, M., & Neemann, J. (1993). Children in homeless families: Risks to mental health and development. *Journal of Consulting and Clinical Psychology, 61*, 335–343.
- Masten, A. S., Sesma, A., Si-Asar, R., Lawrence, C., Miliotis, D., & Dionne, J. A. (1997). Educational risks for children experiencing homelessness. *Journal of School Psychology, 35*(1), 27–46.
- McKinney-Vento Homeless Assistance Act (1987). *As amended, Title VII, Subtitle B; 42 U.S.C. 11431–11435*.
- Menke, E. M., & Wagner, J. D. (1997). A comparative study of homeless, previously homeless, and never homeless school-aged children's health. *Issues in Comprehensive Pediatric Nursing, 20*, 153–173.
- Miller, P. M. (2011). A critical analysis of the research on student homelessness. *Review of Educational Research, 81*(3), 308–337. <http://dx.doi.org/10.3102/0034654311415120>.
- National Center for Homeless Education (2012). Education for homeless children and youths program data collection summary. Retrieved November 20, 2012 from center.serve.org/nche/downloads/data_comp_0909-1011.pdf
- Nigg, J. T. (2006). Temperament and developmental psychopathology. *Journal of Child Psychology and Psychiatry, 47*, 395–422. <http://dx.doi.org/10.1111/j.1469-7610.2006.01612.x>.
- Obradović, J., Long, J. D., Cutuli, J. J., Chan, C.-K., Hinz, E., Heistad, D., et al. (2009). Academic achievement of homeless and highly mobile children in an urban school district: Longitudinal evidence on risk, growth, and resilience. *Development and Psychopathology, 21*(2), 493–518. <http://dx.doi.org/10.1017/S0954579409000273>.
- Pennsylvania Department of Education (2012). 2006 grade 3 reading and mathematics PSSA technical report. Retrieved November 20, 2012 from http://www.portal.state.pa.us/portal/server.pt/community/technical_analysis/7447
- Perlman, S., & Fantuzzo, J. (2010). Timing and influence of early experiences of child maltreatment and homelessness on children's educational well-being. *Children and Youth Services Review, 32*(6), 874–883. <http://dx.doi.org/10.1016/j.chilyouth.2010.02.007>.
- Rafferty, Y., Shinn, M., & Weitzman, B. C. (2004). Academic achievement among formerly homeless adolescents and their continuously housed peers. *Journal of School Psychology, 42*, 179–199.
- Raver, C., & Knitzer, J. (2002). *Ready to enter: What research tells policymakers about strategies to promote social and emotional school readiness among three- and four-year old children*. New York, NY: National Center for Children in Poverty.
- Rescorla, L., Parker, R., & Stolley, P. (1991). Ability, achievement, and adjustment in homeless children. *The American Journal of Orthopsychiatry, 61*, 210–220.
- Rimm-Kaufman, S. E., Curby, T. W., Grimm, K. J., Nathanson, L., & Brock, L. L. (2009). The contribution of children's self-regulation and classroom quality to children's adaptive behaviors in the kindergarten classroom. *Developmental Psychology, 45*, 958–972.
- Rog, D., Holupka, S., & Patton, C. (2007). *Characteristics and dynamics of homeless families with children: Final report*. Washington, DC: U.S. Department of Health and Human Services, Office of Human Services Policy, Office of the Assistant Secretary for Planning and Evaluation.
- Rouse, H. L., & Fantuzzo, J. W. (2009). Multiple risks and educational well-being: A population-based investigation of threats to early school success. *Early Childhood Research Quarterly, 24*(1), 1–14. <http://dx.doi.org/10.1016/j.ecresq.2008.12.001>.
- Rouse, H., Fantuzzo, J., & LeBoeuf, W. (2011). Comprehensive challenges for the well being of young children: A population-based study of publicly monitored risks in a large urban center. *Child & Youth Care Forum, 40*(4), 281–302. <http://dx.doi.org/10.1007/s10566-010-9138-y>.
- Rubin, D. H., Erickson, C. J., San Agustin, M., Cleary, S. D., Allen, J. K., & Cohen, P. (1996). Cognitive and academic functioning of homeless children compared with housed children. *Pediatrics, 97*(3), 289–294.
- SAS Institute Inc. (2008). *SAS/STAT 9.2 user's guide*. Cary, NC: SAS Institute Inc.
- Schteingart, J. S., Molnar, J., Klein, T. P., Lowe, C. B., & Hartmann, A. H. (1995). Homelessness and child functioning in the context of risk and protective factors moderating child outcomes. *Journal of Clinical Child Psychology, 24*, 320–331.
- U.S. Department of Education (2011). SY 2009–10 summary. Retrieved November 20, 2012 from <http://www2.ed.gov/programs/homeless/index.html>
- U.S. Department of Housing and Urban Development (2011). *The 2010 annual homelessness assessment report to congress*. Author.
- U.S. Government, & Culhane, D. P. (2004). *Homeless management information systems (HMIS); data and technical standards final notice*. Departmental Papers (SPP) (Retrieved November 20, 2012 from http://works.bepress.com/dennis_culhane/18)
- Walker, K., Farley, C., & Polin, M. (2012). Using data in multi-agency collaborations: Guiding performance to ensure accountability and improve programs. Retrieved November 20, 2012. http://www.childtrends.org/Files/Child_Trends-2012_02_23_FR_UsingData.pdf
- Welsh, J. A., Nix, R. L., Blair, C., Bierman, K. L., & Nelson, K. E. (2010). The development of cognitive skills and gains in academic school readiness for children from low income families. *Journal of Educational Psychology, 102*, 43–53.
- Willard, J., & Perlman, S. (2012). Cost of childhood homelessness in Pennsylvania. *Presented at the 5th Annual Early Childhood Education Summit, State College, PA*.
- Ziesemer, C., Marcoux, L., & Manvell, B. E. (1994). Homeless children: Are they different from other low-income children? *Social Work, 39*, 658–668.
- Zima, B. T., Wells, K. B., & Freeman, H. E. (1994). Emotional and behavioral problems and severe academic delays among sheltered homeless children in Los Angeles County. *American Journal of Public Health, 84*(2), 260–264. <http://dx.doi.org/10.2105/AJPH.84.2.260>.