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Jinette Comeau
McMaster University, jcomeau5@uwo.ca

Michael H. Boyle
McMaster University

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Article

Patterns of poverty exposure and children's trajectories of externalizing and internalizing behaviors

Jinette Comeau[a,b,*], Michael H. Boyle[a,b]

[a] Offord Centre for Child Studies, McMaster University, Canada
[b] Department of Psychiatry and Behavioural Neurosciences, McMaster University, Canada

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ABSTRACT

Using data from the Child Supplement of the National Longitudinal Survey of Youth, we compare trajectories of externalizing and internalizing behaviors among children exposed to five patterns of poverty from birth to age 14: always or never poor – stable patterns; a single transition into or out of poverty, or repeated fluctuations in and out of poverty – changing patterns. We also examine how low maternal education and single parenthood interact with these poverty exposures to compound their adverse effects. Finally, we compare the magnitude of effects associated with the patterns of poverty exposure, as well as their interactions with low maternal education and single parenthood, on trajectories of externalizing and internalizing behaviors to determine if they are significantly different. Results reveal that initial levels and rates of change in children's trajectories of externalizing and internalizing behaviors are similar across the three changing patterns of poverty exposure, leading us to combine them into a single group representing intermittent poverty. Initial disparities between children who are never poor and their counterparts who are always or intermittently poor are constant over time for internalizing behaviors and grow in magnitude for externalizing behaviors. The cumulative negative effect of poverty exposure over time is stronger for externalizing vs. internalizing behaviors. Low maternal education compounds the adverse effects of persistent poverty, an effect that is similar for externalizing and internalizing behaviors.

1. Introduction

Growing income inequality over the last three decades (Duncan & Murnane, 2011) along with stagnation in wages and employment opportunities have increased the likelihood that children born into poverty will experience persistent exposure over the life course (Chetty, Hendren, Kline, Saez, & Turner, 2014). There is evidence that income volatility has also increased, particularly among lower-income families least able to absorb downward income shocks (Hardy & Ziliak, 2014). Finally, poverty is seldom a unique feature of families; it is often associated with other disadvantages such as low parental education and single parenthood which may serve to compound the adverse effects of poverty on children's mental health (Evans, Li, & Whipple, 2013).

Internalizing behaviors such as emotional problems and externalizing behaviors such as conduct problems are among the most common health concerns experienced by children and youth worldwide (Gore et al., 2011). The environment of poverty exposes children to various adversities that contribute to their externalizing and internalizing behaviors (Evans et al., 2013). Yet, more research is needed to better understand the extent to which stable and changing patterns of poverty exposure from birth elevate children's risk for externalizing and internalizing behaviors over the early life course, whether other disadvantages such as low maternal education and single parenthood exacerbate the risk associated with specific patterns of poverty exposure, and whether this risk is stronger for externalizing or internalizing behaviors.

We classify children from birth to age 14 into five patterns of poverty exposure: always or never poor – stable patterns; a single transition into or out of poverty, or fluctuations in and out of poverty – changing patterns. We then model children's mental health trajectories as a function of their poverty classifications and two important covariates: low maternal education and single parenthood. The three primary objectives of this study are to: (1) compare the mental health trajectories of children exposed to five patterns of poverty; (2) determine if associations between child mental health trajectories and patterns of poverty exposure vary as a function of low maternal education or single parenthood (statistical interactions); and (3) assess the extent to which the associations between child mental health trajectories and poverty exposures, low maternal education and single parenthood differ for two types of mental health outcomes: externalizing and internalizing behaviors.

* Correspondence to: Offord Centre for Child Studies, McMaster University, 1280 Main St, West, MIP 201A, Hamilton, Ontario, Canada L8S 4K1.
E-mail address: comeaj1@mcmaster.ca (J. Comeau).

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1.1. Stable and changing poverty exposure

Chronic poverty exposes children to an expanding array of disadvantages which can exacerbate their stress response systems over time (Evans et al., 2013). In contrast, children who are never poor are able to use their more favorable socioeconomic circumstances to acquire additional advantages over time. These divergent paths may intensify mental health disparities between persistently poor and non-poor children (Macmillan, McMorris, & Kruttschnitt, 2004; McLeod & Shanahan, 1996).

Whereas some children will move into or out of poverty permanently, many will be subject to fluctuating spells over the early life course. Although income increases have been associated with improvements in child mental health (Costello, Compton, Keeler, & Angold, 2003; Strohschein, 2005), and income decreases, with deteriorations in child mental health (Fitzsimons, Goodman, Kelly, & Smith, 2017; Wickham, Whitehead, Taylor-Robinson, & Barr, 2017; Yeung, Linver, & Brooks-Gunn, 2002), relatively little is known about the extent to which fluctuating poverty experiences are associated with children's mental health trajectories, and how these children compare with their counterparts who experience either stable exposure to poverty or a single transition into or out of poverty.

We approach the first objective of this study in three steps. In step one, we model the mental health trajectories of children who experience stable patterns of poverty exposure to estimate differences in their initial levels and course. In step two, focusing on children experiencing change in poverty exposure, we determine if there are sufficient differences in the initial levels and course of their mental health trajectories to retain the three groups of change or to combine them into a single category representing intermittent poverty exposure. It is conceivable that these different patterns of change represent a similar phenomenon: lower-income families experiencing income instability in proximity to the poverty line. In step three, we compare children experiencing stable exposures to their counterparts experiencing change to assess whether there are differences in the initial levels and course of their mental health trajectories.

Whereas most studies have examined the influence of different patterns of poverty exposure on children's mental health in comparison to a reference category that represents never poor children (e.g. Macmillan et al., 2004; McLeod & Shanahan, 1996), we use multiple group latent growth models to make multiple comparisons with respect to the mental health trajectories of children exposed to stable patterns, changing patterns, and stable vs. changing patterns. To our knowledge, only one other study makes multiple comparisons among children who experience different patterns of poverty exposure (NICHD Early Child Care Research Network, 2005). Using a sample of children aged 6 months to 9 years, these authors report that persistent poverty and moving into poverty were associated with increasing behavioral problems, but only in school-aged children. Restricted to an examination of young children, their results raise questions about the effects of different patterns of poverty on adolescent mental health.

1.2. Poverty, maternal education, and single parenthood

Most studies documenting the link between poverty and child mental health consider maternal education and single parenthood as control variables and assume that they have similar effects across the income distribution. Thus, they miss the opportunity to examine how they intersect with poverty to create conditions in which children's mental health is affected by exposure to multiple risks.

Indeed, a defining feature of family poverty is the co-occurrence of risk variables inimical to children's mental health (Evans et al., 2013). For example, better-educated parents often have traits such as more knowledge about parenting practices and better communication skills, and the absence of these traits among less educated parents could exacerbate the adverse effects of poverty on child development (Evans et al., 2013). In addition, single parents generally experience more stressors than married or cohabiting parents, including financial strain, work-family conflict, and higher caregiving demands (Avison, Ali, & Walters, 2007), all of which may compromise their parenting abilities and potentially increase the risk for mental health problems among poor children.

The effect of different patterns of poverty exposure in the context of low maternal education and single parenthood is not well understood. In the second objective of this study, we examine the extent to which the associations between children's mental health trajectories and their pattern of poverty exposure varies as a function of low maternal education or single parenthood.

1.3. Child mental health outcomes

Internalizing behaviors associated with symptoms of depression and anxiety begin in childhood, gradually increase through the middle years, accelerate after puberty, and peak in late adolescence (Bongers, Koot, Van der Ende, & Verhulst, 2003). In contrast, externalizing behaviors linked with aggression tend to peak between 2 and 3 years of age and then decline through to early adolescence (Coie & Dodge, 1998). Externalizing behaviors linked with other forms of conduct problems (e.g., violation of social norms) emerge in early adolescence and peak during the early 20's (Bongers et al., 2003). Thus, trajectories of externalizing behaviors among 5–14 year olds can be expected to decline gradually from age 5 to 11 and begin to increase at age 12. Although previous studies have reported stronger poverty effects for externalizing compared to internalizing behaviors (McLeod & Shanahan, 1996; Costello et al., 2003), to our knowledge, none have empirically tested whether the associations between child mental health and different patterns of poverty exposure as well as their interactions with low maternal education and single parenthood are different for these two outcomes, which is the third objective of this study.

1.4. Research questions and hypotheses

The first three research questions address objective one, and questions four and five address objectives two and three, respectively. 1) Do always poor children and never poor children have different initial levels and rates of change in their externalizing and internalizing behaviors? 2) Do children who move onto, off of, or fluctuate on and off of poverty exhibit sufficient differences in initial levels and rates of change of their externalizing and internalizing behaviors to merit separate classifications or should they be combined into a single category of intermittent poverty exposure? 3) Are initial levels and rates of change in externalizing and internalizing behaviors different for children who experience stable vs. changing exposures to poverty? 4) To what extent do children's experiences of poverty interact with low maternal education and single parenthood to influence initial levels and rates of change in their externalizing and internalizing behaviors? 5) Is the association between patterns of poverty exposure, low maternal education, or single parenthood and child mental health trajectories different for externalizing and internalizing behaviors?

Hypotheses: 1) Children who are always poor will have higher initial levels of externalizing and internalizing behaviors compared to those who are never poor, and the magnitude of this difference will grow over time; 2) Children exposed to different patterns of change in poverty exposure will experience initial levels and rates of change in their externalizing and internalizing behaviors that are roughly aligned with each other and fall midway between those who are never or always poor; 3) Always poor children and never poor children will have initial levels of externalizing and internalizing behaviors that differ from those who experience change, and this difference will also grow in magnitude over time; 4) Low maternal education and single parenthood will exacerbate externalizing and internalizing behaviors among poor (always, move in, move out, or fluctuating) vs. non-poor children; 5)

Patterns of poverty exposure will have a stronger impact on externalizing vs. internalizing behaviors.

1.5. Contributions

This study contributes to the literature on poverty and child mental health by: 1) using longitudinal data that includes repeated measures of externalizing and internalizing behaviors from age 5 to 14, and poverty exposure from birth to age 14; 2) assessing temporal patterns of poverty exposure, including fluctuations in and out of poverty; 3) using a novel analytic approach that relates these patterns to initial levels and rates of change in children's externalizing and internalizing behaviors, and tests for significant differences among children with stable exposures, changing exposures, and stable vs. changing exposures; 4) assessing whether the effects of different patterns of poverty exposure are more pronounced in the context of low maternal education and single parenthood; and 5) assessing whether patterns of poverty exposure have a stronger impact on externalizing vs. internalizing behaviors.

2. Methods

2.1. Sample

The National Longitudinal Survey of Youth (NLSY79) is a representative sample of 12,686 men and women, aged 14–22 at their initial interview in 1979 (Center for Human Resource Research, 2009). Beginning in 1986, a child supplement (NLSY-CS) was initiated to follow children born to the NLSY79 women. From 1986 to 2012, biennial interviews were conducted with 11,512 children aged 0–14 participating in 1–14 measurement occasions.

Our analyses were restricted to children with at least one valid mental health measure between the ages of 5 and 14 (N = 6950). The number of eligible children included in our sample varies by survey year. The 1994 survey year was the most heavily represented with 4197 children. By 2012, 95% of mothers had reached the end of their child bearing years and most children were over age 14, thus only 235 children were included in our sample. To represent time, children were pooled into age groups, resulting in 8 waves of data to measure exposure to poverty (i.e. ages 0, 1–2, 3–4, 5–6, 7–8, 9–10, 11–12, 13–14), and 5 waves of data to measure mental health (i.e. ages 5–6, 7–8, 9–10, 11–12, 13–14). All analyses included a categorical variable of children's year of birth that corresponds with their first year of data collection to control for any potential cohort effects that may arise from restructuring the data.

2.2. Missing data

Missing data in the NLSY-CS arise from sample attrition over time and non-response to specific items in a given survey year. Among the 6950 children in our sample, 14.1% left the study before age 14. At age 5–6, children lost vs. retained in the study were similar in terms of their externalizing behaviors (1.22 vs. 1.25), internalizing behaviors (1.53 vs. 1.46), exposure to poverty (46.5% vs. 47.6%), single parenthood (28.7% vs. 27.6%), and low maternal education (63.2% vs. 60.3%). The high subject retention and similarities between those lost and retained for the analysis suggest that attrition did not bias the findings from this study.

Across the survey years, item non-response was 24–45% for family income, and 4.8–20.1% for family size, maternal education, and single parenthood. Based on response information available across time for all of these variables, we used multiple imputation to impute missing values and selected one complete file at random for analysis (Graham, 2009). Non-response on externalizing and internalizing behaviors (8.5–21.7%) was addressed by using maximum likelihood estimation in the latent growth models.

Because the composition of NLSY-CS changes over time as children enter and leave the study, the Center for Human Resource Research (2009) cautions against the use of their sampling weights in statistical models that incorporate multiple survey years. Conducting the analyses with and without sample weights had little effect on the numerical results and would not alter any of the inferences. Therefore, consistent with the NLSY-CS guidelines, sample weights were not used in our analyses.

2.3. Measures

2.3.1. Children's mental health

Externalizing and internalizing behaviors were assessed using the Behavioral Problems Index (Peterson & Zill, 1986). Sample items for externalizing behaviors include: "cheats or tells lies" and "bullies or is cruel/mean to others". Sample items for internalizing behaviors include: " is too fearful or anxious" and "is unhappy, sad, or depressed". Mothers reported on the frequency of children's externalizing and internalizing behaviors using a three-point scale (0 = not true; 1 = sometimes true; 2 = often true). Items were summed to create a score ranging from 0–8 for externalizing behaviors, and 0–10 for internalizing behaviors. Internal-consistency reliability ranged from .56 to .65 for externalizing behaviors, and .65 to .73 for internalizing behaviors.

2.3.2. Poverty categories

Mothers reported total net family income in the calendar year prior to each wave of assessment. For each family, an income to poverty ratio was calculated by dividing family income by the poverty level for a family of its size. Families with an income to poverty ratio of 2 or less were considered to be living in poverty (i.e. 200% of the federal poverty threshold). This strategy was used because state thresholds for program eligibility are up to two times the federal poverty line.

If a child was continuously poor or not poor from birth to age 13–14, they were classified in the "always poor" or "never poor" categories, respectively. If a child was poor at birth and subsequently moved out of poverty, they were classified in the "move out of poverty" category. The reverse was done for children in the "move into poverty" category. Finally, if a child moved in and out of poverty over the survey years, they were classified in the "fluctuating" category.

2.3.3. Single parenthood and maternal education

Single parenthood is a time-varying variable that represents mothers who are living in their household with a spouse/partner (0) and those who are not (1). Low maternal education represents mothers with at least some post-secondary education (0) and those with a high school diploma or less (1); it was assessed when children were age 5–6 and treated as a time-invariant variable because there was minimal intra-individual variation in maternal education over time.

2.3.4. Control variables

Because of sex-related differences in risk for externalizing (boys) and internalizing behaviors (girls) (Zahn-Waxler, Shirtcliff, & Marceau, 2008), all models were adjusted for the child's sex (0 = male; 1 = female). To adjust for the unequal distribution of racial groups across the poverty categories, the analyses included two dummy-coded variables representing children who are either African American or Hispanic, with non-African American/non-Hispanic White serving as the reference group. Children's year of birth is a categorical variable that ranges from 1980 to 1990, with 1980 serving as the reference group.

2.4. Analytical models

Latent growth models are defined by a latent intercept and slope (Bollen & Curran, 2006). Different specifications of the intercept change its interpretation. For example, it can be specified to represent the average starting value of children's mental health trajectories at age 5–6

or the average end point of their trajectories at age 13–14. Different specifications of the intercept do not alter interpretations of the slope, which is the average rate of change in children's mental health from age 5–6 to 13–14 for each two-year period. Non-linear trajectories were modeled by including a quadratic latent growth parameter.

Multivariate multiple group latent growth models, which simultaneously estimate a separate mental health trajectory for each poverty category with distinct growth parameters and disturbance terms, were used to make comparisons between children who experience different patterns of poverty exposure, and to test for interactions between single parenthood and low maternal education with the poverty category variable (Bollen & Curran, 2006). The multivariate approach simultaneously estimates effects for externalizing and internalizing behaviors in the same model. Following standardization, the coefficients associated with the effects of different patterns of poverty exposure, low maternal education, and single parenthood on both outcomes can be directly compared to examine whether they are significantly different. Whereas time-invariant covariates were included as predictors of the intercept and slope growth parameters, repeated measures of time-varying covariates were included as contemporaneous predictors of children's mental health outcomes and constrained to have the same effect over time. All independent variables were grand-mean centered to facilitate interpretation of the growth parameters.

We began by modeling separate models for the two outcomes before combining them in the multivariate model. We compared a series of nested models with different parameter constraints to determine optimal fit using chi-square difference testing (Bollen & Curran, 2006). First, we tested whether model fit was improved by allowing the intercepts and slopes of each poverty category to differ from every other poverty category. Second, we tested whether the effects of low maternal education and single parenthood in each poverty category differed from every other poverty category, with any differences being interpreted in terms of a significant statistical interaction. These two analytical steps involved estimating two models: one in which the parameters of interest were freely estimated across the poverty categories, and another in which they were constrained to be equal. A significant chi-square difference value indicates that at least one of the parameters is different across the groups being tested. Throughout the model building process, nested models were first tested without covariates, and then by entering low maternal education, single parenthood, child sex, race/ethnicity, and year of birth sequentially to ensure the same model fit was obtained. After establishing the best fitting model, the Wald test of parameter constraints was used to identify the specific parameters that were different across the patterns of poverty exposure, and to compare the effects of the different patterns of poverty exposure, low maternal

Table 1
Mental health outcomes, single parenthood, and inflation adjusted family income (thousands of dollars) by children's age and poverty classification (N = 6950).

	Chronological age in years							
	0	**1–2**	**3–4**	**5–6**	**7–8**	**9–10**	**11–12**	**13–14**
Always Poor (N = 1553)								
Internalizing Behaviors				1.90	2.11	2.16	2.26	2.38
				(1.70)	(1.86)	(1.96)	(1.96)	(2.10)
Externalizing Behaviors				1.69	1.68	1.63	1.60	1.68
				(1.50)	(1.59)	(1.61)	(1.61)	(1.74)
Single Parenthood, %				57.4	59.8	59.4	60.0	60.5
Family Income	8.28	8.01	8.06	7.95	8.03	8.11	8.26	8.41
	(6.62)	(6.30)	(6.04)	(5.99)	(6.04)	(6.04)	(6.03)	(6.79)
Never Poor (N = 2000)								
Internalizing Behaviors				1.13	1.37	1.50	1.55	1.56
				(1.32)	(1.51)	(1.67)	(1.65)	(1.71)
Externalizing Behaviors				.94	.84	.75	.65	.70
				(1.15)	(1.13)	(1.09)	(1.05)	(1.10)
Single Parenthood, %				6.2	7.5	9.0	10.3	12.7
Family Income	32.21	33.99	36.44	38.33	40.7	41.68	43.35	44.12
	(14.61)	(15.23)	(17.00)	(18.65)	(20.18)	(21.08)	(21.46)	(21.82)
Move into Poverty (N = 446)								
Internalizing Behaviors				1.54	1.71	1.81	2.00	1.98
				(1.49)	(1.70)	(1.70)	(1.84)	(1.93)
Externalizing Behaviors				1.31	1.14	1.12	1.17	1.12
				(1.34)	(1.40)	(1.36)	(1.37)	(1.56)
Single Parenthood, %				34.1	35.4	41.5	43.5	48.9
Family Income	22.90	19.53	18.36	17.43	16.85	16.05	15.18	11.08
	(11.79)	(13.22)	(13.84)	(15.57)	(14.36)	(14.87)	(14.01)	(17.37)
Move out of Poverty (N = 596)								
Internalizing Behaviors				1.45	1.59	1.77	1.62	1.88
				(1.54)	(1.63)	(1.79)	(1.64)	(1.96)
Externalizing Behaviors				1.21	1.16	1.06	.97	1.03
				(1.33)	(1.28)	(1.34)	(1.25)	(1.28)
Single Parenthood, %				28.0	25.3	24.2	22.3	21.1
Family Income	10.08	12.27	15.15	17.93	20.36	23.23	25.45	29.72
	(6.67)	(8.74)	(10.60)	(12.11)	(13.27)	(14.91)	(14.04)	(15.92)
Fluctuating (N = 2355)								
Internalizing Behaviors				1.46	1.69	1.79	1.86	1.86
				(1.46)	(1.66)	(1.75)	(1.81)	(1.84)
Externalizing Behaviors				1.20	1.18	1.10	1.04	1.02
				(1.29)	(1.30)	(1.33)	(1.30)	(1.34)
Single Parenthood, %				28.5	29.5	29.6	31.7	32.8
Family Income	17.53	17.10	17.99	18.58	19.28	20.10	21.12	22.11
	(11.96)	(11.83)	(12.26)	(12.71)	(13.44)	(14.52)	(15.66)	(16.53)

Variables are reported as mean (standard deviation) unless noted.
Internalizing range: 0–10; Externalizing range: 0–8; Family income (thousands of dollars) range: 0–120.17.

education, and single parenthood on externalizing and internalizing behaviors. All parameter estimates were standardized to facilitate comparisons of effects sizes across externalizing and internalizing behaviors.

All models were estimated using maximum likelihood with robust standard errors in Mplus (Muthén & Muthén, 1998–2012). This procedure uses data from all available measurement occasions to address missing data on dependent variables and computes standard errors with a sandwich estimator to adjust for the non-independence of observations due to the presence of siblings in the dataset.

3. Results

3.1. Descriptive results

Table 1 presents descriptive results for children's mental health outcomes, single parenthood, and inflation-adjusted family income by child age and the poverty categories. In general, externalizing and internalizing behaviors and the proportion of children living with a single parent are lowest among children who are never poor and highest among children who are always poor. For children who move into poverty, the proportion living with a single parent increases and mean family income decreases; the opposite is observed in the move out of poverty category. Finally, there is a modest increase in family income and the proportion of children living with a single parent in the fluctuating category. Table 2 demonstrates that children in the "always poor" category are disproportionately African American or Hispanic, whereas 76.7% of children in the "never poor" category are Non-African American/Non-Hispanic White. In addition, the proportion of mothers with a high school diploma or less is greatest in the "always poor" category (87.8%) and lowest in the "never poor" category (31.5%).

3.2. Multivariate multiple group latent growth models

3.2.1. Model building results

Table 3 presents results that address questions one through three linked to the first objective of this paper. For both externalizing and internalizing behaviors, model fit is significantly improved by allowing the mental health trajectories of always poor and never poor children to vary from each other (question 1). Although model fit was not improved by allowing the mental health trajectories of children who experience change in poverty exposure to vary from each other (question 2), it was improved by allowing them to vary from their counterparts who are always or never poor (question 3). The categories that represent change in poverty exposure were thus collapsed to create a single category of intermittently poor children.

With respect to question 4, model fit was significantly improved by allowing the effects of low maternal education to vary between the always and intermittently poor categories for externalizing behaviors ($\Delta x^2 = 8.83$, df = 3, $p \leq 0.05$), and between the always and never poor categories for internalizing behaviors ($\Delta x^2 = 6.29$, df = 3, $p \leq 0.1$), indicative of a statistical interaction between low maternal education and persistent poverty. Thus, it was constrained to be equal across all of the poverty categories except the "always poor" category. Constraining the effects of single parenthood to be equal across the poverty categories did not reduce model fit, indicating that there is no interaction between single parenthood and the poverty categories. Table 4 presents results from the final model specification for the multivariate multiple group growth models, and Figs. 1 and 2 graph children's trajectories of externalizing and internalizing behaviors by their pattern of poverty exposure.

3.2.2. Externalizing behaviors

Children exposed to persistent poverty exhibit significantly higher levels of externalizing behaviors at age 5–6 compared to those who are never poor ($\Delta x^2 = 193.67$, df = 1, $p \leq .001$) or intermittently poor ($\Delta x^2 = 81.46$, df = 1, $p \leq .001$), and intermittently poor children exhibit higher levels than those who are never poor ($\Delta x^2 = 51.13$, df = 1, $p \leq .001$). With respect to change in externalizing behaviors over time, children who are never exposed to poverty experience a significantly greater decline in behaviors compared to their peers who are always poor ($\Delta x^2 = 5.55$, df = 1, $p \leq .01$) or intermittently poor ($\Delta x^2 = 6.03$, df = 1, $p \leq 0.01$). The standardized difference in mean levels

Table 2
Distribution of racial/ethnic groups and mothers with a high school diploma or less by children's poverty classification (N = 6950).

	Always poor	Never poor	Move into poverty	Move out of poverty	Fluctuating
African American	53.6	11.1	23.5	34.2	24.7
Hispanic	28.1	12.3	22.2	22.5	20.0
Non-African American, Non-Hispanic White	18.3	76.7	54.3	43.3	55.3
Mother High School Diploma or Less	87.8	31.5	70.9	65.1	66.5

Variables are reported as percentages. The reference category for mother high school diploma or less is not shown.

Table 3
Chi-square difference results for tests of the equality of parameters across the poverty categories.

		Externalizing behaviors		Internalizing behaviors	
	DF	Δx^2	P value	Δx^2	P value
Always vs. Never	3	621.09	< 0.001	277.36	< 0.001
Always vs. Move In	3	39.67	< 0.001	19.01	< 0.001
Always vs. Move Out	3	69.95	< 0.001	40.77	< 0.001
Always vs. Fluctuating	3	215.01	< 0.001	84.22	< 0.001
Never vs. Move In	3	73.16	< 0.001	43.96	< 0.001
Never vs. Move Out	3	65.39	< 0.001	23.75	< 0.001
Never vs. Fluctuating	3	125.43	< 0.001	65.38	< 0.001
Move In vs. Move Out	3	1.82	> 0.05	4.22	> 0.05
Move In vs. Fluctuating	3	1.8	> 0.05	1.07	> 0.05
Move Out vs. Fluctuating	3	1.56	> 0.05	3.55	> 0.05

Table 4
Multivariate multiple group latent growth model.

	Externalizing behaviors			Internalizing behaviors		
	Always poor	**Never poor**	**Intermittently poor**	**Always poor**	**Never poor**	**Intermittently poor**
Means						
Intercept	1.68***	0.94***	1.22***	1.63***	0.96***	1.26***
	(0.04)	(0.03)	(0.03)	(0.05)	(0.03)	(0.03)
Linear Slope	-0.09	-0.30***	-0.15***	0.22***	0.34***	0.28***
	(0.08)	(0.04)	(0.04)	(0.06)	(0.04)	(0.04)
Quadratic Slope	0.09	0.16***	0.06	-0.06	-0.22***	-0.14***
	(0.08)	(0.04)	(0.04)	(0.06)	(0.04)	(0.04)
Low maternal education						
Intercept	0.19***	0.05**	0.05**	0.14*	0.02	0.02
	(0.06)	(0.02)	(0.02)	(0.06)	(0.02)	(0.02)
Linear Slope	-0.25**	0.01	0.01	-0.11	0.01	0.01
	(0.09)	(0.03)	(0.03)	(0.08)	(0.03)	(0.03)
Quadratic Slope	0.25**	-0.02	-0.02	0.11	-0.02	-0.02
	(0.09)	(0.03)	(0.03)	(0.08)	(0.03)	(0.03)
Single parenthood	0.04***	0.04***	0.04***	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Child sex						
Intercept	-0.10***	-0.10***	-0.10***	0.03*	0.03*	0.03*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Linear Slope	-0.05*	-0.05*	-0.05*	-0.08***	-0.08***	-0.08***
	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
Quadratic Slope	0.05*	0.05*	0.05*	0.11***	0.11***	0.11***
	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
African American						
Intercept	0.001	0.001	0.001	-0.02	-0.02	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Linear Slope	0.04	0.04	0.04	-0.10***	-0.10***	-0.10***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Quadratic Slope	-0.02	-0.02	-0.02	0.05	0.05	0.05
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Hispanic						
Intercept	-0.02	-0.02	-0.02	0.004	0.004	0.004
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Linear Slope	-0.001	-0.001	-0.001	-0.09***	-0.09***	-0.09***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Quadratic Slope	0.01	0.01	0.01	0.08**	0.08**	0.08**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)

*p ≤ .05; ** p ≤ .01; *** p ≤ .001

of externalizing behaviors at age 5–6 between children who are never poor vs. always (.74) or intermittently poor (.28), and the corresponding differences in their rates of change (.21 and .15, respectively), are small to moderate effect sizes according to Cohen's criteria (0.2 = small, 0.5 = moderate, 0.8 = large; Cohen, 1988).

Low maternal education is associated with higher levels of externalizing behaviors at age 5–6, and the strength of this association is greater for children who are always poor (Δx^2 = 5.03, df = 1, p ≤ 0.05) compared to their counterparts in the other poverty categories. This is followed by a greater decline (Δx^2 = 7.23, df = 1, p ≤ 0.01) and leveling off (Δx^2 = 8.93, df = 1, p ≤ 0.01) of symptoms. Externalizing behaviors are higher among children living with a single parent (β = 0.04; p ≤ .001). Girls have lower levels of externalizing behaviors at age 5–6 (β = -0.10; p ≤ .001) compared to boys; this is followed by a greater decrease (β = -0.05; p ≤ .05) and leveling off of symptoms (β = 0.05; p ≤ .05). Finally, there are no significant differences in externalizing behaviors by race/ethnicity.

3.2.3. Internalizing behaviors

Mean levels of internalizing behaviors at age 5–6 are significantly

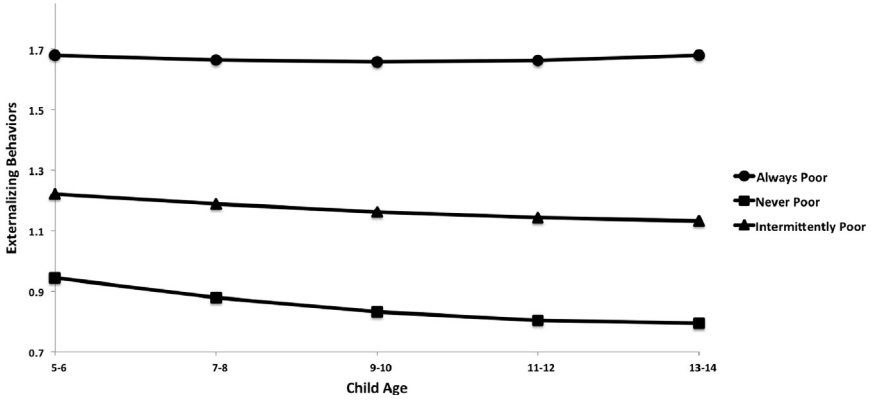

Fig. 1. Trajectories of externalizing behaviors by children's pattern of poverty exposure.

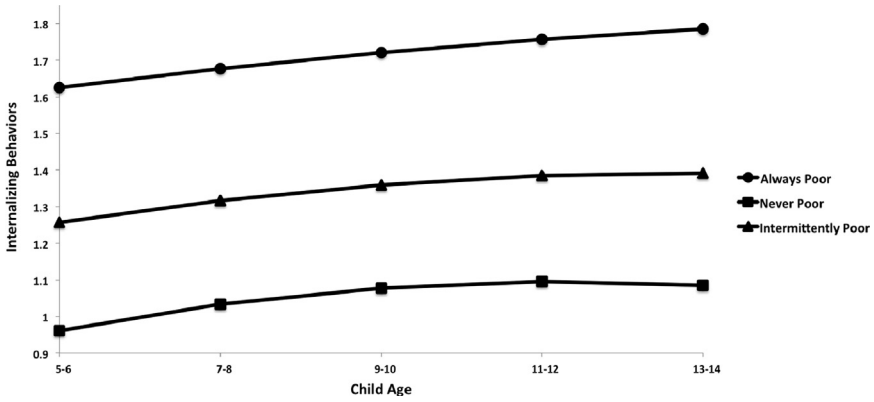

Fig. 2. Trajectories of internalizing behaviors by children's pattern of poverty exposure.

different in all comparisons of the poverty groups (always vs. never poor: Δx^2 = 151.77, df = 1, p ≤ .001; always vs. intermittently poor: Δx^2 = 50.54, df = 1, p ≤ .001; never vs. intermittently poor: Δx^2 = 60.91, df = 1, p ≤ .001). Like externalizing behaviors, the standardized difference in internalizing behaviors at age 5–6 between children who are always vs. never (.67) or intermittently poor (.30) can be considered small to moderate according to Cohen's criteria (Cohen, 1988). Although there are no significant differences in the linear rate of change in internalizing behaviors across the poverty categories, the quadratic growth parameter is significantly lower for children who are never poor vs. always poor (Δx^2 = 4.3, df = 1, p ≤ .05).

Low maternal education is associated with higher levels of internalizing behaviors at age 5–6, an effect that is stronger for children who experience persistent poverty (Δx^2 = 3.86, df = 1, p ≤ .05). Furthermore, internalizing behaviors are higher among children living with a single parent (β = 0.045; p ≤ .001). Girls have higher levels of internalizing behaviors at age 5–6 (β = 0.03; p ≤ .05) compared to boys, but experience a greater decrease (β = -0.08; p ≤ .001) and leveling off (β = 0.11; p ≤ .001) of symptoms over time. Finally, both African American (β = -0.10; p ≤ .001) and Hispanic (β = -0.09; p ≤ .01) children experience a greater decrease in internalizing behaviors over time than their non-African American/non-Hispanic White counterparts.

3.2.4. Comparing externalizing and internalizing behaviors

Multiple group latent growth models estimate the mean initial level and mean rate of change in externalizing and internalizing behaviors for each poverty category. Given that the two mental health outcomes are calibrated on different scales and their normative developmental trajectories differ (i.e. externalizing behaviors tend to decrease whereas internalizing behaviors tend to increase over the study period) these means are not directly comparable. To address these challenges, we compare poverty-related differences in levels of externalizing and internalizing behaviors when children are 5–6 (baseline) and 13–14 (endpoint) by including the poverty categories as dummy variables in two single-group multivariate latent growth models: one in which the intercept represents baseline levels of children's externalizing and internalizing behaviors at age 5–6; and another, the endpoint at age 13–14. We standardize the coefficients associated with the dummy-coded poverty categories (e.g. always poor and intermittently poor), which quantify the mean differences between them and a reference group (e.g. never poor), to facilitate comparisons across the mental health outcomes. The reference groups are alternated to cover off all comparisons. For example, between the never and always poor groups, the baseline difference between levels of externalizing behaviors is .74 (see Table 5). This value corresponds to the difference in mean baseline levels of internalizing behaviors in the always (1.68) and never poor (0.94) groups reported in Table 4. We then test whether or not the poverty-related differences for these coefficients are different across the mental health outcomes. Three significant differences are found, all at age 13–14: differences in externalizing behaviors are larger than internalizing behaviors between the always and never poor groups (.93 vs. 0.57), the intermittent and never poor groups (.35 vs. .24), and the always and intermittently poor groups (0.59 vs. 0.33). There are no significant differences in the effects of low maternal education or single parenthood on the mental health outcomes.

4. Discussion

This study tests hypotheses about the initial level and course of externalizing and internalizing behaviors exhibited by children experiencing five patterns of poverty exposure from birth to age 14; whether or not low maternal education and single parenthood interacted with these poverty exposures to compound their adverse effects; and whether or not the magnitude of associations between different poverty exposures and their interactions with low maternal education and single parenthood were different for externalizing and internalizing behaviors.

The distribution of children in the poverty categories considered in this paper emphasize the extent to which their experiences with poverty

Table 5
Comparison of intercepts that represent children's mental health at age 5–6 and age 13–14 by their pattern of poverty exposure.

	Intercept at age 5–6		Wald test		Intercept at age 13–14		Wald test	
	Externalizing	Internalizing	Δx^2	P value	Externalizing	Internalizing	Δx^2	P value
Always vs. Never	0.74***	0.67***	1.93	0.165	0.93***	0.57***	55.01	0.000
	(0.05)	(0.05)			(0.06)	(0.06)		
Intermittent vs. Never	0.28***	0.30***	0.19	0.667	0.35***	0.24***	7.21	0.007
	(0.04)	(0.04)			(0.04)	(0.04)		
Always vs. Intermittent	0.46***	0.37***	3.22	0.073	0.59***	0.33***	32.09	0.000
	(0.05)	(0.05)			(0.06)	(0.05)		

Note: Models controlled for low maternal education, single parenthood, child sex, race/ethnicity, and year of birth.
*p ≤ .05; ** p ≤ .01; *** p ≤ .001

are stable from birth to age 14. For example, 28.8% of children were never poor and 22.3% experienced persistent poverty. At about $35.7 K, the average income gap between these groups ($44.1 K vs. $8.4 K at 13–14 years) was large. Only 8.6% of children eventually moved out of poverty and fewer still (6.4%) moved into poverty. The majority of children (33.9%) fluctuated in and out of poverty from birth to age 14 with an average family income never exceeding $22.1 K, highlighting the volatile economic circumstances of lower-income families. The high levels of poverty observed in this sample are indicative of the intractable economic hardship experienced by so many families with young children between 1986 and 2012. There is no reason to believe that this pattern of exposure has changed over time for families with young children; in fact, it has likely gotten worse (Duncan & Murnane, 2011). Results from this paper also demonstrate how children with different patterns of poverty exposure are defined by different background characteristics, with chronically poor children being disproportionately exposed to single parenthood and low maternal education, and more likely to be of African American or Hispanic descent.

4.1. Stable poverty exposure

Always and never poor children have mental health trajectories that are distinct from each other and their counterparts who experience change in poverty. At age 5–6, mean levels of externalizing and internalizing behaviors are highest for always poor children, followed by intermittently and never poor children. Although the difference in mean levels of externalizing and internalizing behaviors at age 5–6 between children who are never vs. always or intermittently poor are rather modest, these are population-level effects and if a meaningful income increase could reduce these between-group differences, it could constitute a socially important change. Over time, never poor children experience a greater decrease in externalizing behaviors compared to those who are always or intermittently poor, indicating that disparities are exacerbated. For internalizing behaviors, there is a statistical trend indicating that behaviors are decreasing at a faster rate among children who are never vs. always poor. A continuation of these divergent paths in favor of never poor children would raise concerns about increasing disparities in internalizing behaviors associated with poverty later in adolescence.

Our endpoint analyses indicate that the cumulative negative effect of poverty exposure is stronger for externalizing compared to internalizing behaviors. It is not known if the differential effects on externalizing and internalizing behaviors would continue through adolescence. Internalizing behaviors typically emerge later in adolescence (Bongers et al., 2003), and, because children's mental health is measured between the ages of 5–6 and 13–14, it may be too early to identify diverging trajectories of internalizing behaviors if they exist.

We believe our use of 8 repeated measures of poverty exposure to identify children who experience persistent poverty from birth to age 14 is a significant strength over previous studies. For example, Fitzsimons et al. (2017) use two data points (age 5 and 11) to identify children exposed to persistent poverty and report that it is not associated with their mental health problems at age 11. Presumably, children identified as experiencing persistent poverty could have fluctuated out of and back into poverty either before or during the interval between the two data points, resulting in misclassification. Our concern is that this misclassification has muted the effects of persistent poverty on children's mental health.

In summary, our findings indicate that chronic exposure to poverty is associated with lower mental health early in children's lives, and this association is strengthened over time. If the period of observation was extended further into adulthood, our results hint at the long-term implications that persistent poverty has for children. Denied the opportunities linked to income, children who are always poor face extraordinary educational and occupational challenges and risk for continued externalizing and internalizing behaviors that make it very difficult for them to escape poverty (Chetty et al., 2014). Policies and programs focused on enriching the opportunity structures available to low-income children early in life may promote upward socioeconomic mobility for these children, thus preventing the intergenerational transmission of poverty.

4.2. Change in poverty exposure

Children who experience change in poverty exposure have initial levels and rates of change in externalizing and internalizing behaviors that are similar to each other, but different from their always and never poor counterparts. The largest percentage of these children (33.9%) live in families who fluctuate in and out of poverty and have average incomes midway between those of families classified as always or never poor. The smallest percentage of children who experience change in poverty exposure (6.4%) live in families that move into poverty. However, in this group, the declines in income are precipitous late in the follow-up period just as children are reaching adolescence. Our empirical analyses led us to combine the three groups of change as representing low-income families who are better-off than families mired in poverty but far removed from families never touched by poverty.

Why are the externalizing and internalizing behaviors of children who experience change in poverty exposure similar to one another? In our view, the most likely explanation is that most families exposed to intermittent poverty are occupying an income strata hovering around the poverty line. Although families moving out of poverty are better-off, they have an average income of $29.7 K by the time children are 13–14 years of age, not nearly close to the amount observed for never poor children. Likewise, families who moved into poverty were not situated at the top of the income distribution and likely experienced deprivation before falling below the poverty line. When estimating the effects of poverty transitions on children's mental health, we believe that the income starting point for families is an important consideration. For example, Wickham et al. (2017) estimated that a transition into poverty increased the odds of socioemotional behavioral problems among children aged 5–11 years by OR = 1.41. To be eligible for the analysis, all children and mothers had to be free from mental health problems and not in poverty when children were aged 3 years. We suspect that the income descent for families transitioning into poverty in the Wickham study was much steeper than the descent experienced by families in our study.

In summary, our findings extend past evidence that stable patterns of poverty exposure have a more pronounced impact on child mental health than changing patterns (McLeod & Shanahan, 1996; NICHD Early Child Care Research Network, 2005). These results raise questions about whether income changes that simply move families just above or below a given poverty threshold are very meaningful, particularly in comparison to families that are always or never poor. They also highlight the need for researchers to consider income stratification as a general concern and to focus attention on the sheer magnitude of income gaps between families never experiencing poverty and families intractably poor.

4.3. Low maternal education and single parenthood

Children who are exposed to persistent poverty are more likely to have mothers with low educational attainment, and the interconnection between these two disadvantaged statuses elevates their risk for externalizing and internalizing behaviors. This suggests that higher levels of maternal education may operate as a protective factor for children exposed to chronic poverty, highlighting the value of postsecondary training among low-income mothers. However, the effects of single parenthood were similar for all children, making it an important indicator of risk regardless of children's exposure to poverty. The multitude of adversities associated with poverty (Evans et al., 2013) contributes to its pervasive impact on child mental health, and highlights

the need for studies that consider the ways indicators of disadvantage interact to create particularly risky environments for children's development.

Although the NLSY-CS offers many advantages to studying the impact of economic disadvantage on children's mental health, it also has limitations. One, the non-experimental design restricts our ability to make causal inferences regarding the association between poverty and children's mental health. Two, poverty status and children's mental health are based on maternal reports, which may introduce common-methods bias in the analyses. Three, the limited number of items available to assess children's mental health resulted in substantial measurement error (i.e. low internal consistency), which likely compressed the coefficients estimated in our analyses.

5. Conclusions

In comparing the mental health trajectories of children who experience various patterns of poverty exposure, this paper highlights that stable poverty conditions have a more pronounced impact on externalizing and internalizing behaviors than changing poverty conditions. In addition, they have a stronger impact on externalizing than internalizing behaviors. Indeed, the findings for externalizing behaviors emphasize that the benefits of never experiencing poverty continue to accumulate, resulting in a growing disparity between children who are never poor and their counterparts who experience some form of poverty. Furthermore, our results also indicate that poverty intersects with low maternal education to compound children's externalizing and internalizing behaviors, highlighting the need to consider the constellation of disadvantages in which poor children are exposed. Our results suggest that child mental health disparities associated with poverty should be addressed early in life to prevent them from getting larger over time.

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Conflicts of interest

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References

Avison, W. R., Ali, J., & Walters, D. (2007). Family structure, stress, and psychological distress: A demonstration of the impact of differential exposure. *Journal of Health and Social Behavior, 48*(3), 301–317.

Bollen, K. A., & Curran, P. J. (2006). *Latent curve models: A structural equation perspective.* New Jersey: John Wiley & Sons.

Bongers, I. L., Koot, H. M., Van der Ende, J., & Verhulst, F. C. (2003). The normative development of child and adolescent problem behavior. *Journal of Abnormal Psychology, 112*(2), 179.

Center for Human Resource Research (2009). *A guide to the 1986–2006 child data and 1994–2006 young adult data.* Columbus, OH: The Ohio State University, CHRR NLS User Services.

Chetty, R., Hendren, N., Kline, P., Saez, E., & Turner, N. (2014). Is the United States still a land of opportunity? Recent trends in intergenerational mobility. *The American Economic Review, 104*(5), 141–147.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hilsdale, NJ: Lawrence Earlbaum Associates.

Coie, J. D., & Dodge, K. A. (1998). Aggression and antisocial behavior. In W. Damon, & N. Eisenberg (Eds.). *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (pp. 779–862). New York: Wiley.

Costello, J. E., Compton, S. N., Keeler, G., & Angold, A. (2003). Relationships between poverty and psychopathology: A natural experiment. *The Journal of the American Medical Association, 290*(15), 2023–2029.

Duncan, G. J., & Murnane, R. J. (2011). Introduction: The American dream, then and now. In G. J. Duncan, & R. J. Murnane (Eds.). *Whither opportunity: Growing inequality, schools, and children's life chances* (pp. 3–23). New York: Russell Sage Foundation.

Evans, G. W., Li, D., & Whipple, S. S. (2013). Cumulative risk and child development. *Psychological Bulletin, 139*(6), 1342.

Fitzsimons, E., Goodman, A., Kelly, E., & Smith, J. P. (2017). Poverty dynamics and parental mental health: Determinants of childhood mental health in the UK. *Social Science and Medicine, 175*, 43–51.

Gore, F. M., Bloem, P. J., Patton, G. C., Ferguson, J., Joseph, V., Coffey, C., Sawyer, S. M., & Mathers, C. D. (2011). Global burden of disease in young people aged 10–24 years: A systematic analysis. *The Lancet, 377*(9783), 2093–2102.

Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology, 60*, 549–576.

Hardy, B., & Ziliak, J. P. (2014). Decomposing trends in income volatility: The "wild ride" at the top and bottom. *Economic Inquiry, 52*(1), 459–476.

Macmillan, R., McMorris, B. J., & Kruttschnitt, C. (2004). Linked lives: Stability and change in maternal circumstances and trajectories of antisocial behavior in children. *Child Development, 75*(1), 205–220.

McLeod, J. D., & Shanahan, M. J. (1996). Trajectories of poverty and children's mental health. *Journal of Health and Social Behavior, 37*(3), 207–220.

Muthén, L. K., & Muthén, B. O. (1998). *Mplus user's guide* (7th ed.). Los Angeles, CA: Muthén & Muthén.

National Institute of Child Health and Human Development Early Child Care Research Network (2005). Duration and developmental timing of poverty and children's cognitive and social development from birth through third grade. *Child Development, 76*, 795–810.

Peterson, J. L., & Zill, N. (1986). Marital disruption, parent-child relationships, and behavioral problems in children. *Journal of Marriage and Family, 48*(2), 295–307.

Strohschein, L. (2005). Household income histories and child mental health trajectories. *Journal of Health and Social Behavior, 46*(4), 359–375.

Wickham, S., Whitehead, M., Taylor-Robinson, D., & Barr, B. (2017). The effect of a transition into poverty on child and maternal mental health: A longitudinal analysis of the UK Millennium Cohort Study. *The Lancet Public Health, 2*(3), e141–e148.

Yeung, W. J., Linver, M. R., & Brooks-Gunn, J. (2002). How money matters for young children's development: Parental investment and family processes. *Child Development, 73*(6), 1861–1879.

Zahn-Waxler, C., Shirtcliff, E. A., & Marceau, K. (2008). Disorders of childhood and adolescence: Gender and psychopathology. *Annual Review of Clinical Psychology, 4*, 275–303.