



# Cumulative Effects of Poverty on Children's Social-Emotional Development: Absolute Poverty and Relative Poverty

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Received: 26 October 2020 / Accepted: 2 October 2021 / Published online: 9 November 2021  
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## Abstract

This study examines the cumulative effects of poverty on children's socio-emotional outcomes from ages 5 to 12, using U.S. National Longitudinal Survey of Youth data (N = 6941). Two definitions of poverty were used: absolute poverty as defined by the federal poverty threshold, and relative poverty defined as income less than 50 percent of median household income. (1) Does cumulative poverty, measured in absolute and relative terms, have any impact on children's socio-emotional outcomes? (2) Does this association increase/decrease as children become older? Relative poverty had a stronger adverse effect on children's social-emotional development than absolute poverty, and the adverse effect of relative poverty was bigger when children were older. Child and maternal characteristics affected children's socio-emotional development. The income threshold for absolute poverty is lower than that for relative poverty; using a relative poverty threshold might better identify individuals with limited resources that are at risk of having adverse socio-emotional outcomes.

**Keywords** Cumulative poverty · Absolute poverty · Relative poverty · Socio-emotional development

## Introduction

Poverty has been defined in various ways and its adverse impact on children's developmental outcomes has been examined. The purpose of the current study is to identify the relationship between poverty and social-emotional development of youth. The underlying assumption is that the longer children experience poverty, the greater the adverse impact of poverty on their social-emotional development. In the U.S., absolute poverty is traditionally measured using the federal poverty threshold published by the U.S. Census Bureau (2020). Relative poverty is an alternative poverty measure defined as having income below 50 percent of the current median income. The absolute poverty threshold is

lower than the relative poverty threshold, which means that some households that are identified as poor under relative poverty guidelines are not identified as poor under absolutely poverty guidelines. The use of an alternative relative poverty might be a better way to identify individuals with limited resources whose socio-emotional outcomes may be adversely affected. Despite extensive research on the impact of poverty on children, no study has examined the impact of poverty both by absolutely and relatively defined terms on children's socio-emotional outcomes. The current study looked at the impact of cumulative poverty, measured on absolute and relative terms, on children's socio-emotional outcomes. Two questions were examined: (1) Does cumulative poverty, absolute and relative, have any adverse impacts on children's socio-emotional outcomes? (2) Does this association increase/decrease as children grow from ages 5–6 to ages 11–12?

## Absolute Poverty and Relative Poverty

The United States government created an absolute poverty line during the 1960s based on what it considered was adequate income to support a family based on three times the basic food consumption. The absolute poverty line provides guidance for determining whether an individual qualifies for

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antipoverty government means-tested programs, including school lunch, Head Start, health care, and income transfer programs (supplemental security income, Temporary Assistance for the Needy Families, etc.) (U.S., 2020a). Although the U.S. Census Bureau updates the poverty threshold for inflation each year using the Consumer Price Index, it does not account for the changes in expenses over the last 60 years. The real cost of housing, health care, transportation, technology and other family expenses are greater today than they were in the 1960s.

In contrast to absolute poverty, relative poverty uses societal standards to assess the minimum income needed for a reasonable living situation, and anything less than that standard is considered poor (Segal, 2016). The most widely used poverty measure for the Organization for Economic Cooperation and Development (OECD) countries is “relative poverty,” which is the proportion of people earning less than half their country’s median income (OECD, 2021).

According to the U.S. Census Bureau, the average U.S. poverty rate in 2019 based on the absolute definition is 10.5 percent, which differs depending on race (White 9.1%, Black 18.8%, Hispanic 15.7%) and age (under age 18 14.4%, 18–65 9.4%, 65 and older 8.9%). In particular, the child poverty is significantly high (0–5, 15.5%; aged 6–11, 14.9%; aged 12–17, 12.9%). The U.S. child poverty rate is higher when measured as relative poverty than when measured as absolute poverty. This is perhaps due to the fact that income distribution is significantly unequal/wider when measured by relative poverty than absolute poverty. In 1967, the poverty threshold was \$3,410 (\$26,102 in 2019 U.S. dollars for family size of 4) and the relative poverty threshold was \$3,600 (\$27,556 in 2019 U.S. dollars). In 2019, the absolute poverty threshold was \$26,172, and the relative poverty threshold was \$34,352 (U. S. Census Bureau, 2020). The relative poverty threshold has increased with increased median income, while the absolute poverty threshold remains almost unchanged. In particular, the United States has the third highest rate of relative poverty (17.8%) and the highest relative poverty rate for children 0–17 years old (21.2) amongst the 37 OECD countries (OECD, 2019). In sum, a significant number of children live in poverty and 41% of those children are in low-income families experiencing both absolute and relative poverty (National Center for Children in Poverty (2018). In this context, both measures of poverty should be considered for its adverse impacts on developmental outcomes for children.

## Poverty and Mental Health

The one in five children growing up in poverty in America has elevated risk for socio-emotional difficulties. Studies (Evans & English, 2002; Evans et al., 2001, 2005; Marcal, 2017) indicated that multiple and cumulative stressor

exposure cause an elevated risk of socio-emotional problems accompanying poverty such as chaotic living condition. Lipina and Colombo (2009) found that poverty has specific consequences on the neural basis of cognition, emotion, and self-regulation of millions of children around the world living in poverty. Evans and Kim (2013) suggested that disadvantaged children are more likely to experience a wide variety of physical stressors and psychosocial stressors that alter their genes and their physiological response systems so that children might not be able to effectively change their self-regulatory processes to cope with external demands. McLoyd (1990) found that lower social economic status during early and middle childhood has been associated with lower adaptive functioning, diminished self-confidence and self-esteem, strained peer relations, and an increased presence of severe temper tantrums. Murali and Oyebode (2004) found that children in the poorest households are three times more likely to have a mental illness than children in better off households. This is even truer for children who experience persistent economic stress. Likewise, Reiss (2013) indicated that socioeconomically disadvantaged children and adolescents were two to three times more likely to develop mental health problems.

The amount of time that a child experiences poverty has a substantial impact on the developmental deficits of children. According to Korenman et al. (1995), there are substantial developmental deficits among children who are poor over a number of years relative to those who are not. These deficits are approximately twice as large according to long-term income measures as compared to those based on the single-year measure. Goosby (2007) stated that children who experience persistent poverty have greater difficulties with peer relationships, more conduct problems at school, lower self-esteem, and higher levels of loneliness and depression. Jensen et al. (2017) revealed that persistent exposure to stressors such as poverty causes changes to the neural pathways of children and have long term effects if no intervention is made during childhood. Ramanathan et al. (2017) stated that low socioeconomic status that persisted over time was strongly related to higher rates of mental health problems. The National Institute of Child Health and Human Development Early Child Care Research Network (2005) found that children who live in persistent or chronic poverty have less favorable cognitive and social development and poorer physical and mental health than do those who live in transitory poverty.

In addition to duration of poverty, poverty has been defined in various ways and has adverse impacts on children’s developmental outcomes. Relative poverty seems to have a greater impact on socio-emotional health than absolute poverty although both forms of poverty impact socio-emotional health. For instance, Aber et al. (1997) suggest that relative poverty has the same negative consequences

for individuals regardless of their absolute economic level. Another study (Pickett & Wilkinson, 2007) also stated that the overall wellbeing of children was negatively correlated with income inequality and the percentage of children who experienced relative poverty. Indicators such as juvenile homicides, infant mortality, low birth weight, educational performance, overweight, and mental health problems were worse. Kuruvilla & Jacob (2007) found that absolute poverty is not the only contributor to mental health but relative poverty—dissatisfaction with one's lot in life compared to that of others – is also correlated with emotional distress. Further, they indicated that working poverty, represented by financial deficiency and restricted standards of living, was significantly negatively correlated with psychological well-being.

### Other Factors Affecting Poverty and Mental Health

Children's development is the interaction between children and their environment, including both their micro to macro environment (Bronfenbrenner, 1992). Poverty is closely related to ethnicity and it has a major effect on children's development, in particular for racial-minority groups (Cooper et al., 2010). African American and Puerto Rican children have a higher chance of experiencing persistent poverty and living in areas of concentrated poverty than non-Latino white children (Halle et al., 1997; Mcloyd, 1997). Patterson et al. (1990) explains that poverty, gender, ethnicity, and household composition have all been factors in children's competence. It is noted that boys, especially of minority status who grow up in low income, single-parent households, have higher risks of behavior problems and psychological problems than girls who experience the same adversities. A similar conclusion was reported that poverty has a larger effect on black boys than it did for black girls (Spencer et al., 1988).

Studies show that parental education levels do matter for children's social and emotional development. Poor families are often headed by single parents who have low educational achievement and have low paying jobs or are unemployed all together (Brooks-Gunn & Duncan, 1997). A combination of these factors negatively impacts on the development of children who suffer from poverty. Multiple studies have been developed to look at the relationship between parental educational levels and how it impacts the child's development (Conway & Waldfogel, & Wang, Y, 2018). Parental education levels show that the achievement gap between Black and White students is due to many factors, including parental education and income (Burchinal, 2017). Divorce can affect a child's development. When children's parents go through a divorce, studies found that children could experience setbacks in academic behavior, and internalizing behavior (Arkes, 2014).

The number of family members in the household affects the development of children in poverty. Research shows growing levels of chaos in families where children lack structure as well as routine (Evans, et al., 2005). Low-income adolescents are more likely to face chaos; some of the adverse effects of poverty on socio-emotional adjustment are mediated by exposure to other chaotic living conditions (Evans et al., 2005). Evans et al. (2001) stated that children's socio-emotional health outcomes could be affected by the quality of housing, which has a close association with poverty.

Different parenting skills can have negative and positive effects on children. For example, negative parenting interactions such as the authoritarian parenting style are predicted to show negative outcomes for children (Stack et al., 2010). When children have harsh and inconsistent parenting they can adapt those negative behaviors. Although there are other factors that put a child's social emotional development at risk (poverty, urban crowding, home situations); parenting skills significantly affect a child's emotional functioning (Pachter et al., 2006; Stack, et al., 2010). Further, parenting skills play a mediating factor in attenuating the adverse impact of poverty on children's behavioral problem scores (Kaiser et al., 2017). That is, parenting styles, such as psychological control, as well as mothers' life satisfaction partially mediate the correlation between poverty and child behavioral problems.

Based on the ecological framework (Bronfenbrenner, 1992), the current study will examine the association between two types of poverty and children's socio-developmental outcomes by considering various factors such as duration of poverty, child (ethnicity, gender, age) and family characteristics (education, employment and marital status, family support, number of children). Two questions were addressed: (1) Does cumulative poverty, absolute and relative, have any adverse impact on children's socio-emotional outcomes? (2) Does this association increase/decrease as children become older from ages 5–6 to ages 11–12?. The current study does not have any conflict of interest.

## Methods

### Data

This study used the U.S. National Longitudinal Survey of Youth (NLSY79—Public) and Child Supplement (NLSY 79—CS). The NLSY79 is a nationally representative sample of 12,686 young men and women in the U.S. who were 14–22 years old when they were first surveyed in 1979 (Bureau of Labor Statistics, 2016). The NLSY79 CS is comprised of all children born to NLSY79 mothers. The NLSY is the longitudinal data set that extensively collected

for family income variables such as family income, poverty, welfare status by Bureau of Labor Statistics from 1979 to present. The NLSY also has collected longitudinal data on family background variables (individual, maternal, family, and contextual) continuously starting in 1979. The present study used family data from 1979 the 2014 wave, released in 2012. As of 2012, a total of 11,512 children have been identified as born to interviewed NLSY79 mothers, representing 14 survey rounds for the child sample (U.S. Bureau of Labor Statistics, 2020).

The IRB office notified that the activity described in the present study is not “research” as defined by the Common Rule as codified in the U.S. DHHS regulations for the protection of human research subjects. This is the case since the current study use pre-existing secondary de-identified data (the National Longitudinal Survey of Youth), the activity does not involve research data as defined by the U.S. Department of Health and Human Services [45.CFR.46.102(f)].

## Measures

### Children’s Socio-emotional Score

Starting in 1986, the NLSY assessed children’s behavioral problem scores biannually based on the Behavioral Problem Index (BPI) which was created by Nicholas Zill and James Peterson to measure the frequency, range, and type of childhood behavior problems for children age four and over (Peterson & Zill, 1986). The Behavioral Problem Index has been used across diverse populations including ethnic minorities (Guttmanova et al., 2008) and children in poverty (McLeod & Nonnemaker, 2000). The Behavior Problems Index (BPI) asked mothers about specific behaviors that their children may have exhibited in the previous three months. Three response categories are used: (1) “often true,” (2) “sometimes true,” and (3) “not true.” The total BPI score consisted of 6 subscales, (1) antisocial behavior, (2) anxiousness/depression, (3) headstrongness, (4) hyperactivity, (5) immature dependency, and (6) peer conflict/social withdrawal, based on 28 items. The current study used total standardized total behavioral problem scores.

### Poverty Status

*Absolute Poverty Status.* Absolute poverty status variables were used based on computed poverty status variables created by family income, family size, and federal poverty threshold. Whether a respondent’s total family income for the past calendar year was above or below the poverty level. First, family income information was collected either a) the total family income information provided during the household interview by the parent when the respondent was living in the parental home or b) the sum of component income

sources reported by the respondent (when not living in the parental home) during administration of the “Income” section of each questionnaire. Income sources for the respondent and all persons related to them by blood, marriage, or adoption are included in the calculation. Then, the yearly poverty income guidelines (U.S. Census Bureau, 2019) were used to determine poverty status.

*Relative poverty status.* Based on median family income for each corresponding year, (U.S. Census Bureau, 2019) total household family income was divided by half of median family income (OECD, 2019). For example, 1980 relative poverty, 1980 total family income was divided by half of 1980 median income (\$16,461) and 1981 relative poverty, 1981 total family income was divided by half of 1981 median income (\$19,074), 2012 relative poverty, 2012 total family income was divided by half of median income (\$51,017), etc. Those whose ratio was less than 1 was defined as relative poverty. All relative poverty variables were also aligned according to child’s age.

### Time

We defined the time variable to be four age groups: age 5 to 6, age 7 to 8, age 9 to 10 and age 11 to 12. We stacked the four survey datasets (taken from four longitudinal time points) based on child’s age to make our final target data set with a new time variable with the following values: 1 = ages 5–6, 2 = ages 7–8, 3 = ages 9–10, 4 = ages 11–12.

### Family Support/Parenting Skills

Home environment scores measured based on the Home Observation for Measurement of the Environment-Short Form (HOME-SF). The HOME-SF is a modification of the HOME inventory (Caldwell & Bradley, 1984), an observational measure of the quality of the cognitive stimulation and emotional support provided to a child by family. Home environment data were collected from mothers’ self-reports and interviewer observations during the biannual assessments.

### Number of Children in the Household

Number of children was categorized into 3 groups whether the household has 1 to 2 children (= 1), 3–4 children (= 2), and 5 or more children (= 3).

### Maternal Education

Maternal education was coded based on highest grade mother had attended. For the purpose of this study, mother’s education level was categorized into 3 groups: less than a high school education defined as fewer than 12 years of education, high school defined 12 years of education, and

high school education or more, defined as 12 or more years of education.

### Maternal Cognitive Test Scores

Armed Forces Qualification Test (AFQT, U.S. Bureau of Labor Statistics, 2020) indicates a cognitive ability by measuring their word knowledge, paragraph comprehension, arithmetic reasoning, mathematics knowledge, etc. This score was calculated from the Armed Services Vocational Aptitude Battery (ASVAB) tests, and the majority of respondents took this test in 1980. The scores have been updated standards in 1989 and 2006, and this study used the final version.

### Child's Race

For race, data provide three categories for race/ethnicity: Non-Hispanic Whites, Blacks, and Hispanics. Race/Ethnicity was classified into three categories based on respondents' answers: White, Black, and Hispanic. Hispanics included those who identified as Mexican–American, Chicano, Mexican, Mexicano Cuban, Cubano Puerto Rican, Puertorriqueno, Boricua Latino, Other Latin American, Hispano, or Spanish descent. Blacks included those for whom race was coded “black” and ethnic origin was “non-Hispanic” or those whose ethnic origin was coded black, Negro, or Afro-American regardless of race coding. Whites included those whose race was coded “white” or “other” and who did not identify themselves as either Black or Hispanic in answer to the ethnicity question. “Other” category was those persons who were Japanese, Chinese, Vietnamese, Asian Indian, Native American, Korean, Eskimo, Pacific Islander, or of another race besides Black or White (U.S. Bureau of Labor Statistics, 2021).

### Child Birth Years

Based on years when a child was born, birth years was created. Quartile score was used to divide children into 4 groups: Children who were born between 1970 and 1981 were coded as 1, 1982 to 1985 as 2, 1986 to 1990 as 3, and 1991 to 2011 as 4.

### Analysis

Data were aligned according to children's age to rule out different effects of different age. Time variable was created based on four age groups (time 1 = age 5 to 6, time 2 = age 7 to 8, time 3 = age 9 to 10 and time 4 = age 11 to 12). The linear mixed model was used to answer research questions. First, to determine impacts of poverty (absolute vs relative),

poverty was entered into the model after controlling for all base line variables including children's race, children's birth year group, number of children, mother's education, home parenting scores, and time. Second, to determine whether impacts of poverty increase/decrease as children become older, the interaction effects between time and poverty were entered into the model. We adopted Bonferroni method for multiple comparisons at  $p < 0.05$ .

### Results

Table 1 indicates that all study variables significantly differ across race. More black children were born earlier years than Hispanic and white children. White mothers had higher cognitive test (AFQT) scores and had more years of education than Hispanic and black mothers. Numbers of children were higher in the order of Hispanic, black and white families. White mothers had higher home parenting scores than Hispanic and black mothers; higher for Hispanic mothers than black mothers. Poverty rate, both absolute and relative, were highest in black than Hispanic and white families. Black children had significantly higher behavioral problem scores than Hispanic and white children.

### Findings for Research Question: Effects of Poverty on Socio-Emotional Outcomes

#### Absolute Poverty

As shown in Step 1, Table 2, there was no main effect of absolute poverty on children's overall socio-emotional scores from ages 5–6 to 11–12. Further children's socio-emotional scores did not significantly change over time as children became older. Hispanic children ( $\beta = -1.40$ ,  $p < 0.01$ ) had fewer socio-emotional problems than white children. Compared to children born from 1991 to 2011, those born earlier years had significantly more socio-emotional problems ( $\beta = 6.57$ ,  $p < 0.001$ ,  $\beta = 5.67$ ,  $p < 0.001$ ,  $\beta = 3.70$ ,  $p < 0.001$ ). Children of mothers who had higher AFQT scores ( $\beta = -0.03$ ,  $p < 0.001$ ) had fewer socio-emotional problems. Children who had received positive parenting ( $\beta = -0.01$ ,  $p < 0.001$ ) had significantly fewer socio-emotional problems. Compared to children whose mothers had college or more education, children of mothers with no high school education ( $\beta = 3.96$ ,  $p < 0.001$ ) or those with high school education ( $\beta = 1.23$ ,  $p < 0.01$ ) had more socio-emotional problems. Children who lived in household with 1–2 children ( $\beta = 1.61$ ,  $p < 0.01$ ) had more socio-emotional problems than those who lived with 5 or more children in household.

**Table 1** Descriptive statistics for variables included in the study

Race	Hispanic	Black	White	Total	
Variables	1451	2192	3298	6941	<i>p</i> <sup>j</sup>
<b>n (%)</b>					
Child birth group <sup>a)</sup>	2.54 (1.13)	2.32 (1.1)	2.52 (1.11)	2.47 (1.12)	ac
Mothers' cognitive scores <sup>b)</sup>	24.3 (21.4)	19.7 (17.4)	49.2 (27.4)	36.3 (27.6)	abc
Maternal education <sup>c)</sup>	1.88 (.70)	2.03 (.66)	2.27 (.65)	2.11 (.68)	abc
<b>Number of children<sup>d)</sup></b>					
Ages 5–6	1.53 (.64)	1.47 (.60)	1.37 (.54)	1.43 (.58)	abc
Ages 7–8	1.59 (.65)	1.53 (.62)	1.43 (.56)	1.49 (.60)	abc
Ages 9–10	1.62 (.66)	1.55 (.62)	1.45 (.57)	1.52 (.61)	abc
Ages 11–12	1.63 (.65)	1.57 (.63)	1.44 (.57)	1.52 (.61)	abc
<b>Family support (HOME)<sup>e)</sup></b>					
Ages 5–6	94.6 (15.9)	88.9 (17.0)	102.2 (13.3)	96.9 (16.0)	abc
Ages 7–8	94.2 (15.9)	89.2 (16.9)	102.3 (13.5)	96.8 (16.1)	abc
Ages 9–10	95.4 (15.8)	91.4 (16.7)	102.2 (13.7)	97.6 (15.8)	abc
Ages 11–12	96.5 (15.3)	92.3 (16.2)	102.6 (14.0)	98.2 (15.6)	abc
<b>Absolute Poverty<sup>f)</sup></b>					
Ages 5–6	32.5	48.1	17.9	29.4	abc
Ages 7–8	32.0	46.1	16.7	28.3	abc
Ages 9–10	30.6	43.2	17.7	27.9	abc
Ages 11–12	29.2	41.4	16.9	26.6	abc
<b>Relative poverty<sup>g)</sup></b>					
Ages 5–6	36.7	54.3	22.5	34.4	abc
Ages 7–8	36.2	53.1	21.4	33.5	abc
Ages 9–10	35.0	50.6	21.0	32.7	abc
Ages 11–12	33.6	49.2	18.8	31.3	abc
<b>Socio-emotional problems<sup>h)</sup></b>					
Ages 5–6	103.6 (15.1)	105.1 (15.0)	102.8 (15.0)	103.6 (15.0)	ac
Ages 7–8	104.7 (14.7)	106.4 (15.0)	104.2 (14.7)	105.0 (14.8)	ac
Ages 9–10	105.4 (15.1)	107.0 (15.4)	104.9 (14.9)	105.7 (15.1)	ac
Ages 11–12	105.6 (15.0)	107.4 (15.2)	105.0 (14.9)	105.9 (15.0)	ac

<sup>a</sup>1 = Born 1970 to 1981, 2 = Born 1982 to 1985, 3 = Born 1986 to 1990, 4 = Born 1991 = 2011

<sup>b</sup>Based on Maternal Armed Forced Qualification Test Scores (AFQT)

<sup>c</sup>1 = less than 12 years, 2 = 12 years, 3 = 13 or more years of education

<sup>d</sup>1 = 1 or 2 children, 2 = 3 or 4 children, 3 = 5 or more children

<sup>e</sup>Home Observation for Measurement of the Environment (Bradley & Caldwell, 1984)

<sup>f</sup>Based on absolute poverty guidelines

<sup>g</sup>Based on 1/2 median income for the corresponding years

<sup>h</sup>Behavior Problem Index (Peterson & Zill, 1986)

<sup>i</sup>a = Hispanic vs Black; b = Hispanic vs White; c = Black vs White. Post-hoc test  $p < .05$

## Relative Poverty

As shown in Step 1, Table 3, there was significant main effect of relative poverty on socio-emotional problem scores. Overall, children in relative poverty from ages 5 to 12 had more socio-emotional problems ( $\beta = 0.96$ ,  $p < 0.01$ ) than those not in relative poverty. As children got older, children's socio-emotional problems increased. Compared to children at ages 11–12, children's socio-emotional problem scores were lower at ages 5–6 ( $\beta = -1.88$ ,  $p < 0.001$ )

and at ages 7–8 ( $\beta = -0.69$ ,  $p < 0.01$ ). All other baseline variables showed similar results as found in absolute poverty. Hispanic children, children born in later years, children with 2–3 siblings had fewer socio-emotional problems. Maternal characteristics had same effects as shown in absolute poverty. Children's socio-emotional problem scores were lower when mothers had more years of education, had higher cognitive test scores, provided positive home environments.

**Table 2** Linear mixed model coefficients (B, Wald, Odds Ratios) predicting children's socio-emotional problems by absolute poverty

Variables	Socio-emotional problems		Socio-emotional problems	
Intercept	106.6 (1.15) [104.3, 108.8]	***	106.6 (1.15) [104.4, 108.9]	***
Child race				
Hispanic	− 1.40 (0.48) [− 2.35, − .45]	**	− 1.39 (.48) [− 2.34, − .45]	**
Black	− 0.64 (0.46) [− 1.53, .26]	ns	− .64 (.46) [− 1.53, .26]	ns
White	reference		reference	
Birth group				
Group 1	6.57 (0.49) [5.60, 7.54]	***	6.58 (.49) [5.61, 7.55]	***
Group 2	5.67 (0.47) [4.57, 6.59]	***	5.67 (.47) [4.75, 6.58]	***
Group 3	3.7 (0.45) [2.82, 4.58]	***	3.70 (.45) [2.82, 4.58]	***
Group 4	reference		reference	
Maternal education				
1 (<high school)	3.96 (0.59) [2.80, 5.12]	***	3.95 (.59) [2.79, 5.11]	***
2 (high school graduate)	1.23 (0.42) [.41, 2.05]	**	1.22 (.42) [.41, 2.04]	**
3 (≥ college education)	reference		reference	
Number of children				
1 (1–2 children)	1.61 (0.62) [.40, 2.83]	**	1.60 (.62) [.38, 2.82]	**
2 (3–4 children)	0.98 (0.61) [− .21, 2.17]	ns	.96 (.61) [− .22, 2.15]	ns
3 (5 or more children)	reference		reference	
Maternal cognitive Test scores	− <b>0.03</b> <b>(0.01)</b> [− .05, − .02]	***	− .03 (.01) [− .05, − .02]	***
Family support	− <b>0.01</b> (0.00) [− .01, − .00]	***	− .01 (.0007) [− .01, − .00]	***
Time				
Time 1	− 1.85 (0.28) [− 2.39, − 1.30]	***		
Time 2	− 0.66 (0.25) [− 1.15, − .18]	**		

**Table 2** (continued)

Variables	Socio-emotional problems	Socio-emotional problems
Time 3	– 0.33 (0.25) [– .81, .15]]	ns
Time 4	reference	
Absolute poverty	<b>0.34</b> (0.28) [– .20, .88]	ns
Interactions between poverty and time		
Poverty=1 and Time 1		– 1.18 (.49) [– 2.13, – .22] *
Poverty=2 and Time 1		– 1.999 (.32) [– 2.63, – 1.37] ***
Poverty=1 and Time 2		– .47 (.42) [– 1.30, .36] Ns
Poverty=2 and Time 2		– .67 (.29) [– 1.24, – .10] *
Poverty=1 and Time 3		– .09 (.45) [– .96, .79] ns
Poverty=2 and Time 3		– .35 (.29) [– .91, .22] ns
Poverty=1 and Time 4		.17 (.51) [– .82, 1.17] ns
Poverty=2 and Time=4		reference

## Findings for Research Question 2: Interaction Effects of Poverty and Time

### Absolute Poverty

As shown in Step 2, Table 2, no interaction effects between absolute poverty and time was found. As shown in Fig. 1, although when children were at ages 5–6, children in absolute poverty had marginally more socio-emotional problems than children not in absolute poverty ( $M = 104.3$  vs  $103.5$ ). However, as children became older, there was no significant difference in socio-emotional problems between children in poverty and not in poverty ( $M = 105.5$  vs  $105.7$ ). Further pair-wise analysis indicated that socio-emotional problem scores for children in absolute poverty did not significantly change as they became older ( $103.4$ ,  $104.8$ ,  $105.2$ ,  $105.5$ , ns).

### Relative Poverty

As shown in Step 2, Table 3, interaction effects between relative poverty and time were found. As shown in Fig. 2, when children were at ages 5–6, 7–8, 9–10 difference between children in relative poverty and those not in poverty was not significant. When children were 11–12, children in relative poverty had significant more socio-emotional problems than children not in relative poverty ( $M = 105.1$  vs  $107.3$ ). Further pair-wise analysis indicated that there were significant changes among children in relative poverty as they became older. Compared to ages 5–6, children had higher socio-emotional scores at ages 9–10 (contrast estimate =  $1.374$ ,  $SE = 0.520$ ,  $p < 0.05$ ) and 11–12 (contrast estimate =  $3.002$ ,  $SE = 0.549$ ,  $p < 0.001$ ). Children's socio-emotional scores also significantly increased from ages 9–10 to 11–12 (contrast estimate =  $1.628$ ,  $SE = 0.494$ ,  $p < 0.01$ ).



**Table 3** Linear mixed model coefficients (B, Wald, Odds Ratios) predicting children's socio-emotional problems by relative poverty

Variables	Socio-emotional problems		Socio-emotional problems	
Intercept	106.3 (1.14) [104.1, 108.5]	***	105.1 (1.11) [102.9, 107.2]	***
Child race				
Hispanic	− 1.39 (.48) [− 2.34, − .45]	**	− 1.46 (.48) [− 2.40, − .53]	**
Black	− .71 (.46) [− 1.60, .19]	ns	− .56 (.45) [− 1.45, .32]	ns
White	reference		reference	
Birth group		***		
Group 1	6.51 (.49) [5.54, 7.48]		6.53 (.48) [5.59, 7.48]	***
Group 2	5.64 (.47) [4.72, 6.55]	***	5.71 (.46) [4.80, 6.62]	***
Group 3	3.68 (.45) [2.80, 4.56]	***	3.64 (.44) [2.77, 4.51]	***
Group 4	reference		reference	
Maternal education				
1 (< high school)	3.80 (.59) [2.64, 4.96]	***	3.87 (.59) [2.73, 5.02]	***
2 (high school graduate)	1.19 (.42) [.38, 2.01]	**	1.34 (.41) [.54, 2.15]	***
3 (≥ college education)	reference		reference	
Number of children				
1 (1–2 children)	1.78 (.62) [.56, 3.00]	**	1.69 (.61) [.50, 2.88]	**
2 (3–4 children)	1.09 (.61) [− .10, 2.27]	+	1.09 (.59) [− .07, 2.24]	+
3 (5 or more children)	reference		reference	
Maternal cognitive Test scores	− .03 (.01) [− .05, − .01]	***	− .03 (.01) [− .05, − .02]	***
Home	− .01 (.0007) [− .01, − .00]	***	− .00 (.0007) [− .01, − .00]	***
Time				
Time 1	− 1.88 (.28) [− 2.42, − 1.33]	***		
Time 2	− .67 (.25) [− 1.15, − .18]	**		

**Table 3** (continued)

Variables	Socio-emotional problems	Socio-emotional problems
Time 3	– .32 (.25) [– .80, .16]	ns
Time 4	reference	
Relative poverty	.96 (.31) [.36, 1.56]	**
Interactions between poverty and time		
Poverty=1 and Time 1		– .82 (.49) [– 1.76, .12]
Poverty=2 and Time 1		– 1.66 (.30) [– 2.25, – 1.06]
Poverty=1 and Time 2		.02 (.43) [– .83, .86]
Poverty=2 and Time 2		– .36 (.27) [– .89, .16]
Poverty=1 and Time 3		.58 (.45) [– .30, 1.46]
Poverty=2 and Time 3		– .13 (.26) [– .64, .38]
Poverty=1 and Time 4		2.19 (.49) [1.23, 3.15]
Poverty=2 and Time=4		reference

## Discussion

### Adverse Impacts of Relative Poverty on Children's Socio-emotional Outcomes

The results of our study indicate that there were no differences in socio-emotional issues in children who have lived in absolute poverty and those children who have not lived in absolute poverty. In contrast, those that lived in relative poverty had more socio-emotional problems than those that did not live in relative poverty. The relative poverty line is higher than the absolute poverty line, which results in different categorizations of poor and non-poor for the two poverty thresholds. Children who were relatively poor, but living above the absolute poverty threshold, ([RPANP],  $M = 110.2$ ,  $SD = 16.1$ ) had higher social-emotional problem scores than those who were poor both by absolutely and relatively ([RPAP],  $M = 108.8$ ,  $SD = 15.8$ ). Children of RPANP were likely to live with fewer siblings than those of RPAP. The

household income of RPANP might be similar in the lower quartile range based on median income distribution. The income to needs ratio per person, however, might be higher for children with fewer siblings that made them above the absolute poverty line. That is, under the lowest quartile family income, children living in a large family size were more likely to live in absolute poverty while those living in a small family size were living above absolute poverty. The previous studies (Grinde & Tambs, 2016; Liu et al., 2015; McHale et al., 2012) indicated that, when children live in poverty without any siblings could have more behavioral problems than those living with more siblings. Perhaps, compared to children of RPAP, RPANP children's socio-emotional well-being may be negatively affected because there is a lack of siblings' positive effects on behavior and socio-emotional development.

Further analysis indicated that children who were relatively poor, but living above the absolute poverty threshold were more likely to be born in recent years. That is, the

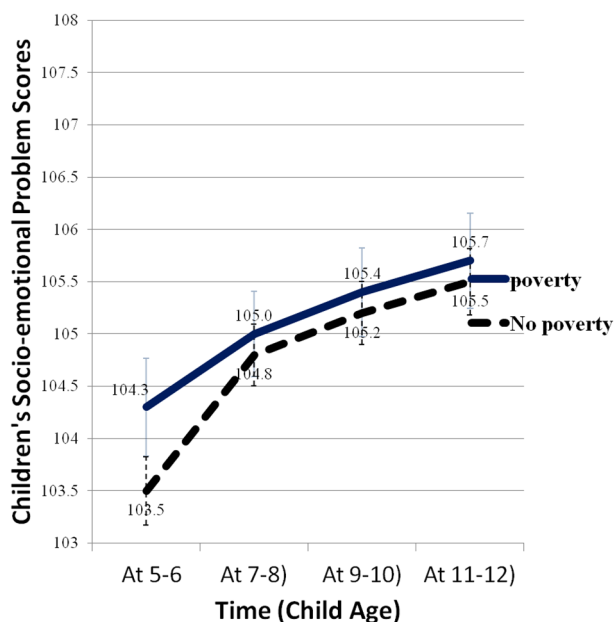


Fig. 1 Interaction effects between absolute poverty and time on children's socio-emotional problems

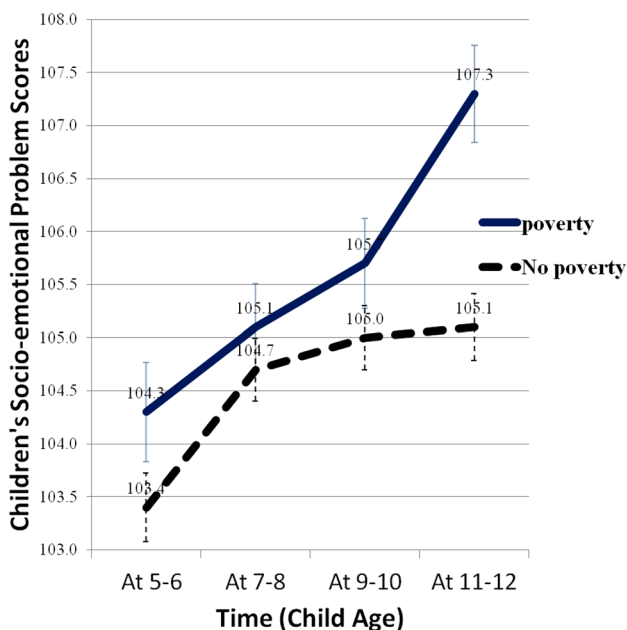


Fig. 2 Interaction effects between relative poverty and time on children's socio-emotional problems

proportion of children in RPANP was increased as the children's birth years became more recent (correlation of 0.056,  $p < 0.01$ ); from the earliest years to the latest years, respectively, it was 14.2%, 16.3%, 20.0%, and 18.7%. This might be because median income has been increased more than absolute poverty line as years go by. The absolute poverty threshold was increased from \$8,414 in 1980 to \$17,916 in

201 (2.13 times). The relative poverty line (half of median income) increased from \$8,855 in 1980 to \$25,027 (2.83 times). According to the U.S. Census Bureau (2020), U.S. median household income in 2019 increased 6.8% from 2018, and the official poverty rate defined by absolute poverty threshold decreased 1.3 percentage points. This indicates that although the poverty rate decreases, more children live in lower income households. In 2019, among children under age 18 (72,637 children), the poverty rate defined by the absolute poverty threshold was 14.4% (10,466 children). However, a significant number of children were still living in households whose income was under 200% below the poverty threshold (34.5%; 25,028 children). The absolute poverty line might underestimate those living in poverty because it sets too low of a threshold. Using median income to define the poverty line might better reflect the extent to which individuals have limited resources and be more sensitive to the impact of reduced resources on social-emotional developmental outcomes.

### Impacts of Poverty and Children's Age

Our findings showed that the adverse impacts of relative poverty became worse for older children. As shown in Fig. 2, significant differences between those in the relative poverty group and those in the relative non-poverty group occurred for the youth who are 11–12 years old. This may be due to the fact that children at ages 11–12 might experience more poor social contexts through school, friendships, neighborhoods, and family conditions.

Evans et al. (2005) indicated that children with lower socioeconomic status are known to reside in chaotic environments, which include dysfunctional family structure, noisy, violent, and crowded neighborhoods, and other unstable, unpredictable conditions. Older children are more cognizant of these conditions and therefore become more psychologically distressed. These chaotic conditions were more likely to cause psychological, socio-emotional distress. Repeated experiences of poverty over a child's life course have been a predictor of adolescent anxiety and depression (Najman et al., 2010). Experiencing persistent poverty without adequate government support due to marginal family income could compound the adverse impacts as children become older. The amount of time and the time period that a child spends in poverty have substantial impacts on the developmental deficits among children.

The current U.S. government mean-tested programs do not reflect children's age. Thus, distress experienced by older children, relatively poor but not absolutely poor, could be becoming larger as they experience more years of deficiencies. Studies (Kessler et al., 2005; Merikangas et al., 2010) suggest that half of all lifetime cases of mental health disorders start by the age of 14 years and that about half of all

Americans would meet the criteria for a form of a mental health disorder sometime in their life with the first presence of onset in childhood or adolescence. From a developmental standpoint, youth who are 11–12 years old want to be liked and accepted by their peers. Around this time, youth tend to become more aware of their appearance and experience changing bodies. Being poor or having fewer clothes, things, or funds for entertainments becomes more obvious. The U.S. government means-tested programs could consider not only increasing poverty thresholds to identify more children in poverty but also allocate marginally more amounts for older children.

### Other Factors Affecting Children's Mental Health

Children whose parents provide positive parental support had lower social emotional problem scores. Studies (Brooks-Gunn & Duncan, 1997; Pachter et al., 2006; Stack et al., 2010) have shown that children who were raised in nurturing home environments had more positive cognitive, emotional and behavioral outcomes. Comparatively, harsh disciplinary practices and non-supportive or non-responsive parenting or parental mental health issues adversely affect children's developmental outcomes. If children are parented with positivity and consistency, they can adapt to those types of behaviors. Thus, family support is critical for a child's positive social emotional development.

Compared to children whose mothers had college or more education, children whose mothers had less years of education were likely to have more socio-emotional problems. Poor families are often headed by single mothers who have low educational achievement and have low paying jobs or are unemployed all together (Brooks-Gunn & Duncan, 1997). In 2017, those who had less than a high school education were 6 times more likely to be poor than those who had college or more education (U.S. Census Bureau, 2019). If parents do not go on to college or even finish high school, their children could likely follow in their footsteps. As shown on academic outcomes (Burchinal, 2017), parental education is an important factor affecting children's socio-emotional development (Flores et al., 1999).

When everything else in the model is controlled for, Hispanic children had fewer socio-emotional problems than white children. There was also no difference in socio-emotional problems between black and white or black and Hispanic children. These factors may allow white children to become more susceptible to chaotic conditions than Hispanic children and therefore experience more socio-emotional problems. Hispanic families might have higher informal social support than white and black families (Lee & Rispoli, 2017). Further, Hispanic children are younger (birth year cohort is more recent, born 1990's compared to 1980's). As shown in the current study, children's socio-emotional

problems increase as children become older. Although not included in the current study, Hispanic families might be more recent immigrant families than other ethnicities which might be more acceptable or different for children's socio-emotional standards. There may be different cultural mechanisms for how Hispanic children cope with the stressors of poverty than how white and black children cope with poverty (Halle et al., 1997).

### Study Limitations

First, the relative poverty line is higher than absolute poverty line, so individuals living in absolute poverty are a subset of individuals living in relative poverty. The current study did not intend to compare three groups: non-poverty group, absolutely poor group, and relatively poor group. Rather it intends to examine the associations between poverty and mental health with different guidelines and their implications for implementing poverty-related programs and policies. Second, children's socio-emotional outcomes were measured by one indicator, the children's behavioral problem index (BPI) based on parental report. Socio-emotional scores are observed scored by parents. Further, the BPI in the current study was not used to screen clinically problematic children for psychological services ( $M = 100$ ,  $SD = 15$ , Zill, 1991) but to identify the relationship between poverty and social-emotional development. A future study can include other indicators as measured by teachers or self-reported to enhance validity. Third, despite racial disparity on child poverty, only three categories of children's race were used such as Hispanic, black and white children. Poverty differs within these 3 categories (American Indians and Alaska Natives, Native Hawaiians and other Pacific Islanders, etc.). Further, about 2.9 percent of people reported more than one race in the 2010 Census (U.S. Census Bureau, 2019). Fourth, although detailed cumulative poverty and family support variables as well as other time variant variables from ages 5 to 12 were used, schooling, peer-interactions were not included in the study due to lack of data availability. Further, despite the fact that two aspects of poverty were examined, family assets were not included in the study. Family economic well-being that affects child-wellbeing consists of various components, such as wage/income, assets, and service availability (health insurance). Interpretations need to be cautious by considering these limitations.

### Practice/Policy Implications

Children who grow up in poverty are at great risk for mental health problems. In particular, children who are not eligible under absolute poverty guidelines but who are relatively poor reveal the highest socio-emotional problems at ages 11–12. This suggests that we have to review current poverty

guidelines of means-tested programs as to whether they target the neediest population. The current absolute guidelines do not consider increased income inequality since they were developed 60 years ago. Perhaps, it should adapt median household income as the basis and also consider children's age (more allocation for older children) for benefit amount. Regardless if it is absolute or relative poverty, children's socio-emotional problems increase as children become older, particularly during early adolescence. Further, children who had socio-emotional problems at the ages 5–6 tend to have more socio-emotional problems at ages 11–12. It is difficult to break the cycles of poverty and children's socio-emotional development does not change easily. Early intervention programs such as Head Start might be an important experiment for low income children to prevent/to promote positive socio-emotional development. Family support as well as other family variables (maternal education, maternal cognitive test scores) are strongly associated with children's socio-emotional development. Although income deficiency affects children's socio-emotional development, it may also require a whole societal system to promote mental health including nurturing parenting, family dynamics, cultural competency, social support, chronological adaptation, etc.

In sum, the current study found that poverty has a significant adverse impact on children's mental health. The adverse impacts became more prevalent as children became older from ages 5–6 to 11–12. Using the relative poverty line, which is higher than the current absolute poverty line, might better identify those who have reduced resources and are at risk for adverse social-emotional developmental outcomes. Poverty guidelines should consider measuring poverty using household income relative to the median income and allocate additional income for older children. In order to prevent adverse impacts of poverty on mental health outcomes, additional studies on other factors that might affect positive socio-emotional well-being can help to identify individuals that are at risk for mental health problems at an earlier age.

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