Does Child Tax Credit Make Children Better Off?

Hyein Kang*

December 2022

Abstract

This study examines the short-term and long-term impact of CTC exposure on educational and health outcomes of children. I use time-series variation in the maximum CTC as an identifying variation for the short term analysis and average annual maximum CTC between age 0 to 16 for the long term analysis. Reduced-form results suggest that, in the short-term, an increase of $1,000 in the maximum CTC improved children's math and reading test scores, reduced obesity, reduced externalizing behavioral issues, and increased internalizing behavioral issues. I find these impacts are most pronounced among non-Hispanic white children and non-Hispanic children of other races. I also find that most impacts were driven by children living with married parents. For the long-term, an additional $1,000 of the annual CTC exposure during age 0-16 increased the likelihood of high school graduation or receiving the General Educational Development certificate by 2.3 percentage points, raised the probability of completing college by 8.7 percentage points, and increased the probability of being obese in adulthood by 2.3 percentage points. There is no significant association between CTC exposure during childhood and other adulthood health outcomes such as self-reported health status, high blood pressure, depression, or loss of interest.

Keywords: income tax credit; child well-being; child subsidies
JEL Classification Codes: H24, J13, I38

*Chapin Hall at the University of Chicago. E-mail: hkang@chapinhall.org. This paper benefited from comments by Rajeev Darolia, David Hulse, Carlos Lamarche, and Olga Malkova, James Ziliak. All errors are my own.

1 Introduction

Child subsidy is a particularly important policy to support families with children. The Child Tax Credit (CTC) provides tax benefits to working parents who raise children under 17 years old. Together with the Earned Income Tax Credit (EITC), the CTC lifted 4.8 million children out of poverty in 2015 (Hoynes and Schanzenbach, 2018).[1] A large body of literature find that the EITC led to a reduction in low birth weight (Hoynes et al., 2015), an improvement in children's test scores (Dahl and Lochner, 2012, 2016, 2017), and an increase in college enrollment rate (Manoli and Turner, 2018). Additionally, recent studies show that the childhood exposure to the EITC had a substantial, positive impact on educational attainment, labor market outcomes, and health status in the long-term (Bastian and Michelmore, 2018; Braga et al., 2020). While there has been an extensive research on the impact of the EITC on child well-being, little is known about the impact of the CTC on child outcomes. In this paper, I examine how the CTC affects children's education and health outcomes contemporaneously and in their later life.

The CTC may affect children in families through a number of mechanisms. First, the increase in the maximum amount of the CTC relieves financial burden of families. Second, the CTC may affect children via changes in parental labor supply. This change in parental labor supply may affect children's outcomes as it affects time spent with children or type of child care (family-based to center-based). Third, changes in parental labor supply may impact parental health, which in turn potentially affect children's outcomes. It is important to note that the CTC has been available for families with a wide range of income, and therefore it has potential to have differential impacts on children in low-income, middle-income, and middle-high income families.[2]

As the CTC provides tax benefits to families with children every year, eligible fam-

[1] This is equivalent to 6.5 percentage point of the child poverty rate. See Table 5b of Renwick and Fox (2016) for more details.

[2] Goldin and Michelmore (2022) find that children in the households with medium and medium-high income distribution are more likely to benefit from the CTC.

ilies could receive the CTC for up to 17 years.[3] The CTC impacts dynamics of family resources, parental labor market behaviors, and living environment, which affects children throughout their development. Improving resources and environment during childhood is critical in outcomes in later life (Cunha and Heckman, 2007; Chetty et al., 2011a,b; Currie and Almond, 2011; Heckman et al., 2013). Moreover, changes in parental employment during childhood may have persistent impacts on children's outcomes (Han et al., 2001; Ruhm, 2008; Waldfogel et al., 2002).

I evaluate the contemporaneous and long-term benefits of the CTC. This contributes to existing literature by providing further evidence on the effect of public policy on child outcomes. Previous work has shown that children are impacted by government programs such as the EITC (Bastian and Michelmore, 2018; Berger et al., 2017; Braga et al., 2020; Dahl and Lochner, 2012; Hamad and Rehkopf, 2016; Hoynes et al., 2015; Jo, 2018; Manoli and Turner, 2018; Michelmore and Lopoo, 2021a), Child Care Tax Credit (Jiang et al., 2020), Food Stamp Program (Hoynes et al., 2016; Frongillo et al., 2006), Medicaid (Lykens and Jargowsky, 2002), Mothers' Pension program (Aizer et al., 2016) and Canadian child benefits (Milligan and Stabile, 2011). To my knowledge, the only paper that investigates the impact of the CTC on children is by Rostad et al. (2020), focusing on childhood injuries and behavior problems.

To understand the impact of the CTC in the short-term, I use data from the 1997, 2002, 2007 waves of the Panel Study of Income Dynamics (PSID) Child Development Supplement (CDS) and the 1984-2007 waves of the PSID. I use variations in the maximum CTC to identify contemporaneous impact of the CTC on children's outcomes. Using the changes in the maximum CTC captures exogenous policy variation and addresses potential endogeneity of using actual CTC benefits with respect to children's educational and health outcomes.[4] For long-term analysis, I use data from the 2005-2019 waves of the PSID Transition into Adulthood Supplement (TAS) and the 1984-2019 waves of the PSID.

[3] Children are eligible for the CTC until they turn 17 years old.

[4] For example, parental labor supply can affect both actual CTC receipt and child outcomes.

For these young adults, I construct a measure of childhood CTC exposure. I define annual CTC exposure as the maximum CTC benefits, averaged by the number of years that a child was eligible for.[5]

I find that an increase in the maximum CTC is associated with a contemporaneous improvement in test scores, a lower probability of obesity, less aggressive behavioral problems, and more withdrawn behavioral problems. A $1,000 increase in the maximum CTC increases math scores by 0.03 standard deviation, increases reading score by 0.01 standard deviation, reduces obesity by 4.6 percentage points, decreases externalizing behavioral problem index, and increases internalizing behavior problem index. When I look at boys and girls separately, I find that girls and boys respond similarly in terms of math scores and internalizing behavioral problems. However, an improvement in reading scores and a reduction in externalizing behavioral problems are only observed among boys. A reduction in the probability of being obese is only observed among girls.

I also investigate the short-term impact of the CTC by race, Hispanic ethnicity and marital status of parents.[6] I find that white children benefit the most from the CTC. An additional $1,000 in the maximum CTC increases white children's math scores by 0.03 standard deviation, increases reading score by 0.02 standard deviation, increases the likelihood of the primary caregiver reporting very good or excellent health by 2.6 percentage points, reduces the probability of being obese by 5.5 percentage points, decreases externalizing behavioral problem index, and increases internalizing behavioral problem index. Children of other races also shows positive responses in terms of math and reading scores. In addition, children with married parents are benefited from the program relatively more. I find positive results for these children in terms of test scores, obesity, and externalizing behavioral problems.

[5]Some individuals were not exposed to the CTC for all years of childhood. For example, an individual born in 1995 was exposed to the CTC beginning in 1998.

[6]I use children of white, black, and other races to denote non-Hispanic white, non-Hispanic Black, and non-Hispanic children of other races, respectively. Children are identified as Hispanic if at least one of the parents is Hispanic.

In the long-term, estimates suggest that an additional $1,000 in average annual CTC exposure from age 0 to 16 increases the likelihood of receiving high school diploma or the General Educational Development (GED) certificate by 2.3 percentage points, increases the likelihood of completing college by 8.7 percentage points, and increases the likelihood of being obese by 2.3 percentage points.

The rest of the paper proceeds as follows. Section 2 provides potential mechanism of how CTC may affect child well-being. Section 3 describes the empirical strategy. Section 4 describes the data from the PSID CDS and the PSID TAS. Section 5 presents the results. Section 6 concludes.

2 Mechanisms

2.1 How Might the CTC Influence Children's Outcomes in the Short-term?

The CTC is a child benefit program that increases disposable income of families by reducing their tax burden. The CTC may influence children's outcomes contemporaneously through several channels: income, parental employment, time spent with children and psychological well-being of parents. The CTC may benefit or hinder child well-being depending on the direction and magnitude of how each factor impacts children.

First, the CTC increases income of families by providing direct tax benefits, shifting out their budget constraint.[7] An increase in the budget sets provide greater economic resources for families, which improves parents' ability to purchase more goods and services that are beneficial to children's development such as books, essential healthcare services, food, and living conditions (direct income effect).

Second, the CTC may benefit psychological well-being of families by easing their

[7]The families must be in the phase-in, flat, or phase-out region of the CTC to benefit from the program. This earned income range is quite wide; for example, in 2017 tax year, married couple with two qualifying children earning from $3,000 to $150,000 were eligible for partial or full amount of the CTC.

financial burden. A reduction in parental mental distress is likely to lower children's distress level as well, which provides a healthier environment for children and help children improve their academic and social skills (indirect income effect).[8] Milligan and Stabile (2011) shows Canadian child benefit had significant positive impacts on mental health and well-being of both mothers and children. Kang (2022) finds that the CTC improved self-reported health of low-educated married mothers.

Third, the CTC may affect children's outcomes via changes in parental employment behavior. The impact of maternal employment on children has been extensively studied yet results are mixed. Prior studies find the impact of early maternal employment on child development to be negative (Baum II, 2003; Berger et al., 2008; Brooks-Gunn et al., 2002; Waldfogel et al., 2002), positive (Vandell and Ramanan, 1992), differential (Ruhm, 2008), or null (VanderVen et al., 2001). An increase in parental labor supply may lead to less parent-child interactions and more social activities for children (e.g., a shift from at-home parental care to center-based child care, an increase in after-school activity for children attending school), which can help or undermine children's academic or social development.[9] Regarding health outcomes, existing literature finds an association between maternal employment and child's probabilities of obesity or overweight risk (Anderson et al., 2003; Ruhm, 2008; Takahashi et al., 1999). As Kang (2021) finds no relationship between the CTC and employment of married mothers, children in two-parent families are less likely to be affected by this mechanism. This may lead to heterogeneous impacts on children living with single-parent and multi-parent families.

[8] Prior studies show the importance of maternal health on children (Dodge, 1990; Downey and Coyne, 1990; Cummings and Davies, 1994; Goodman and Gotlib, 1999).

[9] The impact of center-based child care on children compared to home-based care is not necessarily negative. Howes et al. (2008) find children shows better academic skills from enrollment in state-funded pre-Kindergarten. Felfe and Lalive (2014) find positive impact of early center-based care (before age 3) on children with less-educated mothers.

2.2 The Impact of the CTC on Children Might be Prolonged

A large body of research shows income support programs affected children's outcomes in the short-term. Prior research finds that the EITC improved test scores of children (Dahl and Lochner, 2012, 2016, 2017), reduced incidence of low birth weight (Hoynes et al., 2015), reduced child abuse and neglect (Berger et al., 2017), increases childhood obesity (Jo, 2018), increases college enrollment (Manoli and Turner, 2018).

Recent studies show that the EITC also affects families in the long term. Michelmore and Lopoo (2021b) find that EITC exposure during early childhood increases family wealth in their middle childhood. Bastian and Michelmore (2018) estimate the long-term impact of the EITC on education and employment outcomes. They find EITC exposure during middle childhood (ages 13-18) increases the probability of completing high school, the likelihood of completing college, the probability of being employed, and earnings. Braga et al. (2020) find that an additional $100 of EITC exposure during childhood (age 0-18) improved self-reported health outcomes and decreased obesity rate in young adulthood (age 22-27). The impacts are stronger for children in a family headed by single parent and for children with less-educated parents.

Likewise, CTC exposure in childhood can influence children's outcomes in the long-term as the CTC changes the dynamics of income, parental health, and parental labor supply over time. First, the CTC increases disposable family income every year. A child born in 1998 was exposed to a total of the $14,600 in CTC benefits during their childhood (age 0-16). Kang (2021) finds that the CTC was associated with increases in employment of single mothers. Together with the tax benefit itself and increases in earnings via labor supply response, the CTC generates extra family income. This increase in economic resources is likely to affect children later in life directly (via purchases of goods) and indirectly (through improvements in family psychological well-being). The impact of the CTC on children via parental labor supply may be persistent. Studies find that changes in

maternal labor behavior in early childhood can impact children in the long term (Brooks-Gunn et al., 2010). Center-based child care may improve children's academic and social skills (Vandell et al., 2010) or health outcomes (Campbell et al., 2014) in their adulthood. Overall, the long-term impact of the CTC on child well-being in their later life will be a combination of direct income effect, indirect income effect, and impacts via changes in parental labor supply.

Additionally, there might be intertwining impacts between short-term outcomes and long-term outcomes. For example, Smith (2009) studies how childhood health impacts socioeconomic outcomes in their later life. He finds that having a poor health in childhood have negative lifetime impacts on family income, household wealth, individual earnings and labor market outcomes.

3 Model

3.1 Short-term Impacts

To estimate the short-term effect of the CTC on children's outcomes, I use changes in the maximum CTC over time. Using this variation addresses potential endogeneity concerns from using the actual CTC receipt of children, as the variation in the maximum CTC comes from the changes in the policy only, not behavioral changes of individuals.[10] One might raise a question about which parent claims the CTC when the child's parents are divorced or separated.[11] As I estimate an intent-to-treat by using an exposure to the CTC, not the effect of the CTC on children who actually received it, this is not a concern. To examine how the CTC exposure affected children's short term outcomes, I use the

[10] I use maximum CTC to take advantage of birth year information. The PSID CDS allows to calculate accurate exposure to the CTC as it provides birth year information of each sample child (detailed in Section 4).

[11] By default, the custodial parent claims the CTC. The noncustodial parent can claim the CTC if the custodial parent agrees to release the claim in writing (e.g., IRS Form 8332).

following model:

$$y_{ist} = \alpha + \beta MAXCTC_t + X_i'\Gamma + Z_{it}'\Delta + \eta_s + u_{st} + \epsilon_{it} \quad (1)$$

where y_{ist} is educational and health outcome variables of child i at interview year t (1997, 2002, 2007). On the right-hand side, $MAXCTC_t$ is inflation-adjusted maximum CTC in interview year t.[12] The vector X_i' includes time-invariant individual characteristics including indicators for girl, white, black, Hispanic, and cohort fixed effects.[13] The vector Z_{it}' includes individual characteristics including indicators for whether parent was married at the time of interview and whether at least one parent completed high school. The terms η_s are state fixed effects.[14] The variable u_{st} is the state-by-year unemployment rate, which captures the effect of the unemployment rate that may have affected children's educational achievement or health status. Robust standard errors are used.

3.2 Long-term Impacts

To examine how the CTC exposure affected children's long term outcomes, I use a similar definition for tax credit exposure used in Bastian and Michelmore (2018) and Braga et al. (2020). I estimate the following model:

$$y_i = \alpha + \beta CTC_{i(0-16)} + X_{i(0-16)}'\Gamma + \eta_s + \mu_t + \epsilon_{it} \quad (2)$$

where y_i is the educational and health outcome for individual i in their young adulthood. $CTC_{i(0-16)}$ is CTC exposure, defined as the average annual maximum CTC during child-

[12]The maximum CTC for the year 1997 is zero for all children as the CTC was introduced in 1998. For years 2002 and 2007 are non-zero values. All dollar amount is inflation-adjusted to 2020 dollars.

[13]Cohort fixed effects are constructed by birth year of the child.

[14]I do not include time fixed effects as the maximum per-child CTC varies by tax year only.

hood (age 0-16).[15,16] The vector $X'_{i(0-16)}$ includes time-invariant personal demographics including indicators for female, white, black, Hispanic, and whether at least one parent of the individual completed 12 years of education. $X'_{i(0-16)}$ also includes cohort fixed effects. η_s is state fixed effects based on the state of residence of the individual in the year in which the individual was last observed, and μ_t is year fixed effects based on the interview year in which the individual was last observed. Robust standard errors are used.

The CTC exposure in a specific age interval throughout childhood might affect long term outcomes differently. To examine this, I modify equation 2 by splitting the CTC childhood exposure into three stages: age of 0-5, 6-12, and 13-16.[17] I use the following model:

$$y_i = \alpha + \beta_1 CTC_{i(0-5)} + \beta_2 CTC_{i(6-12)} + \beta_3 CTC_{i(13-16)} + X'_{i(0-16)}\Gamma + \eta_s + \mu_t + \epsilon_{it} \tag{3}$$

where $CTC_{i(0-5)}$ is CTC exposure between age 0 and 5, $CTC_{i(6-12)}$ is CTC exposure between age 6 and 12, and $CTC_{i(13-16)}$ is CTC exposure between age 13 and 16.[18] All other control variables are the same as in the equation 2.

4 Data

The main data used come from the Panel Study of Income Dynamics (PSID). I use the main PSID interview, the PSID Child Development Supplement (CDS), and the PSID

[15] I calculate the average annual maximum CTC as the sum of the maximum CTC that an individual was eligible for during their childhood years (when the individual is 0-16 years old) observed in the main PSID file divided by the number of year the individual is observed. This method is similar to the one used by Braga et al. (2020) for their calculation of the average annual exposure to EITC. This method solves the issue of any error arising from imputation of the CTC exposure (maximum CTC amount) for years that PSID interview was not conducted and the individual was eligible for the interview but not observed.

[16] The amount is inflation-adjusted to 2020 dollars.

[17] I use this age range/cutoffs as most of kids enter school at age of 6 and kids may be left alone at home unsupervised beginning at age 13 in most states. Bastian and Michelmore (2018) and Braga et al. (2020) also use similar age intervals for examining the long-term impacts of the EITC on children.

[18] The CTC exposure is measured in the same method as equation 2. I divide the sum of the maximum CTC available to the family of an individual during the childhood years (when the individual is 0-5, 6-12, and 13-16 years old) observed in the main PSID file by the number of year the individual is observed.

Transition into Adulthood Supplement (TAS). The PSID is a nationwide, longest longitudinal household-level survey data in the United States that started in 1968. The sample has grown from 4,800 families in 1968 to 9,500 families in 2019 as the PSID follows the children of the original sample. The data is available annually for 1968-1997 and biennially from 1997.

The PSID collects information at the family-level and the individual-level. The individual-level information is mainly about adults in the family (reference person and spouse). The CDS is a supplement of the PSID that was introduced in 1997. It provides a rich set of information about children of the PSID families.[19] The first wave of the CDS in 1997 (wave I) included up to two children aged 0-12 at the time of interview per family, resulting a cohort of 2,394 households with 3,563 children.[20,21] The 1997 CDS cohort was followed across two additional waves in 2002/03 (wave II) and 2007/08 (wave III) for the children remained under age 18 in the year of each wave.[22] After reaching the age of 18, the 1997 CDS cohort were followed every other year by the TAS, which began in 2005.[23] The TAS collects data regarding education, health, labor market outcomes. Once individuals establish economic independence and their own households, they join the main PSID but still remained in the TAS as long as they are age-eligible.[24]

4.1 Data for Short-term Analysis

For the short term analysis, I use the 1997, 2002, and 2007 waves of the CDS for childhood outcomes and the 1984-2007 waves of the main PSID to link parental/household-level

[19] The main PSID collects limited information about children.

[20] The 1997 CDS included up to two children per PSID families. For families with three or more children eligible for the CDS, two of them were randomly chosen as the 1997 CDS sample.

[21] The 1997 CDS cohort was born between 1984 and 1997.

[22] This reduces observations to 2,907 children and 1,608 children in 2002/03 and 2007/08 waves.

[23] The 2005-2015 waves of the TAS only interviewed the 1997 CDS cohort. From the 2017 wave, any young adults aged 18-28 were eligible for the TAS.

[24] According to the TAS 2013 User Guide, less than 50% of individuals form their own household before their mid-20s, either as a reference person or as a spouse.

information. My sample consists of individuals born between 1984-1997.[25] The PSID CDS provides information on demographics, educational outcomes, and health outcomes.

For educational outcomes, I use subtests of the Woodcock-Johnson revised Tests of Achievement (WJ-R). These subtests are the Letter-Word Identification (reading skills) and the Applied Problems (math skills).[26] The Letter-Word Identification subtest assesses symbolic learning (matching pictures with words) and reading identification skills (identifying letters and words), while the Applied Problems subtest assesses math reasoning, achievement, and knowledge (Hofferth et al., 1997; Duffy and Sastry, 2014). The WJ-R are widely used in prior research studying children's cognitive skills (Dearing et al., 2009; Huston et al., 2005; Nelson et al., 2004; Pilkauskas et al., 2018). For purposes of interpretation, I normalize each subtest score to have a mean of zero and a standard deviation of one.[27]

For health outcomes, I look at obesity (BMI $\geq$ 30) and behavioral problems. I use the Behavioral Problem Index (BPI) developed by Peterson and Zill (1986). The BPI is constructed based on 30 items that measure children's psychological and behavioral problems, reported by a child's primary caregiver.[28] It is composed of 16 items regarding externalizing behavioral problems and 13 items regarding internalizing behavioral problems. Externalizing behavioral problems include items about aggressive behaviors, such as anger, sudden changes in mood, and disobedience. Internalizing behavioral problems include items about withdrawn behaviors, such as anxiousness, sadness, and nervousness. Details on the questionnaire are displayed in the Appendix Table A1. The BPI is commonly used in previous studies examining behavioral outcomes of children (Baydar

[25] The 1997 CDS cohort (observed in the CDS I-III) were 0-12 at the time of interview in 1997.

[26] The WJ-R test is composed of nine subtests that measure children's academic skills on different dimensions (Duffy and Sastry, 2014). Among the nine subtests, some of them are not administered to the CDS cohorts, some of them are partially available across waves, or some of them are only administered to certain age groups. I use two subtests that are available across all waves and administered to all age groups (3-17 years).

[27] The coefficient of interest, β, in equation 1 is the standard deviation change in each subtest score from a \$1,000 increase in the maximum CTC.

[28] Children younger than three years old were not assessed with the BPI.

and Brooks-Gunn, 1991; Lu et al., 2019; Yeung et al., 2002).

Table 1 presents descriptive statistics for the sample of children in the 1997, 2002, 2007 waves of the PSID CDS. Half of the children in the sample are girls, 64% are white, 15% are black, and 14% are Hispanic. About 72% of children live with married parents. For educational outcomes, standardized score of WJ-R subtests are reported.[29] Most of the children in the sample have very good or excellent health (85%) and 19% are obese. The average scores for the total BPI, externalizing BPI, and internalizing BPI are 8, 6, and 3, respectively.

4.2 Data for Long-term Analysis

For the long term analysis, I use the 2005-2019 waves of the TAS for young adulthood outcomes and the 1984-2019 waves of the main PSID to link their childhood information. My sample consists of individuals who are born between the years 1984-2001.[30] The PSID TAS provides information on individual characteristics (race, Hispanic ethnicity, state of residence, mother's education level, father's education level), education level, health status (self-reported health, BMI,[31] high blood pressure, depression, loss of interest). I then link the information about each individual's birth year,[32] number of children in each family unit, and marital status of the head of the household from the main PSID file and link the data to the TAS.[33] For the sample weight, I use PSID cross-sectional weight averaged across the interview years the individual are observed.[34]

[29] For standardized scores, 90-110 represents 25-75 percentile.

[30] The oldest individual observed in the initial TAS (2005 wave) is born in 1984, and the youngest individual observed in the most recent TAS (2019 wave) is born in 2001.

[31] BMI is constructed from self-reported height and weight.

[32] Birth year information is important in the analysis as the CTC eligibility is determined by the age at the end of the year. Age information in the PSID is age at the time of interview. Instead, I create age for each sample individual using the birth year to determine the CTC eligibility more accurate.

[33] Marital status are used to calculate the fraction of childhood years spent in which the individual's parents were married.

[34] I choose to use the PSID cross-sectional weights because 1) this weights are consistently available between 1997-2019 and 2) the TAS longitudinal weights are not missing for some observations depending on whether an individual participated in earlier waves of the CDS or the TAS.

For outcome variables, I look at educational and health outcomes of young adults. High school diploma and the GED certificate is evaluated at age 20,[35] some college experience is evaluated at age 24, college completion is evaluated at age 26, average health outcomes are evaluated between ages of 18 and 28. For health outcomes, I look at self-reported health status (whether an individual reported their health to be very good or excellent), obesity (whether an individual's BMI is 30 or greater), high blood pressure (whether an individual has ever been diagnosed with high blood pressure or hypertension), depression (whether an individual reported that they had two weeks or longer period of feeling sad, empty, or depressed for the past 12 months from the time of the interview), and loss of interest (whether an individual reported that they had two weeks or longer period of losing interest in things they usually enjoyed for the past 12 months from the time of the interview).

Table 2 displays descriptive statistics for the sample of young adults in the 2005-2019 waves of the PSID TAS. All dollar values (CTC exposure) are inflation-adjusted to 2020 dollars using the Consumer Price Index. The average annual CTC exposure between age 0 and 16 is $894. The average annual CTC exposure ranges from $299 (age 0 to 5) to $1,218 (age 13-16). This wide range and large standard deviations are because 1) the CTC was implemented in 1998 and was expanded frequently over time and 2) large number of individuals in the sample did not receive the CTC at birth.[36]

In terms of individual characteristics, half of the sample are female, 65% are white, 15% are black, and 15% are Hispanic. Most of the sample has at least one parent who has completed high school (80%). Most young adults spent their childhood with married parents (74%).

Educational outcomes are measured at a certain age. A significant majority of the sample had completed high school or received the GED by age 20 (95%). Over 90% of the

[35] I choose the age of 20 for the threshold as 29% of the 1997 CDS cohort who were 18 years old and living with their parents were still attending high school.

[36] The samples were born between 1984 and 2001.

sample completed high school by age 20. Most of the sample had some college experience as of age 24 (75%), while only 39% of the sample finished college by the age of 26.[37]

Health outcomes are measured between ages 18 and 28 (average value of the young adulthood). Over half of the sample reported very good or excellent health, 20% are obese (BMI $\geq$ 30), and 6% have ever been diagnosed with high blood pressure. In terms of mental health, 16% have depression (feeling depressed for over 2 weeks in the past 12 months), and 23% experience a loss of interest (lost interest in most things for over 2 weeks in the past 12 months).

5 Results

In this section, I discuss the estimated impact of the CTC on children's educational and health outcomes in the short-term and in the long-term. I first present short-term estimates for the whole sample and by gender. I then discuss estimates for subgroups across race, Hispanic ethnicity, and marital status of parents. I then present estimates of the CTC on children's long-term outcomes. I also explore whether a specific period a child is exposed to the CTC is more important than other stages in their childhood.

5.1 Short-term outcomes

Table 3 reports the short-term estimates of equation 1. There is a statistically significant association between the CTC and test scores and health of the child. A $1,000 increase in the maximum CTC increases the Applied Problem (math) subtest score by 0.03 standard deviations and increases the Letter-Word Identification (reading) subtest score by 0.01 standard deviations. The positive impact on math scores is similar across boys and girls, while the impact on reading score is statistically significant for boys only. For health outcomes, an extra $1,000 of maximum CTC decreases obesity by 4.6 percentage points

[37] Not all individuals in the sample reached age 26 as of 2019. The youngest sample is 18 years old in the 2019 wave of the TAS. I only include those who reached 26 at the end of 2019 for the college degree analysis.

among children. I find that this impact on obesity is observed for girls only. Finally, when I look at behavioral problem index, I find no statistically significant impact. However, this is due to the differential effect of the CTC on externalizing and internalizing indexes. Once I look at the externalizing BPI and the internalizing BPI separately, I find that the CTC is associated with a decrease in externalizing BPI (0.50 units) as opposed to an increase in internalizing BPI (0.75 units). I find that the decrease in externalizing was only for boys, while both girls and boys show an increase in the internalizing behavioral issues.

About 75 percent of white and Asian children are eligible for the full benefits of the CTC while only about 50 percent of black and Hispanic children are eligible for the full credit (Goldin and Michelmore, 2022).[38] Also, married couples are more likely to receive the full CTC compared to unmarried couples. Therefore, I investigate whether the CTC has stronger effect across demographics. First, I perform analysis by restricting the sample to white, black, other races, and Hispanic children. The estimated effects of the CTC on math scores are most pronounced among white children (0.03 standard deviation increase) and children of other races (0.06 standard deviation increase). I observe a similar pattern for reading skills. The positive effects of the CTC on reading scores are most pronounced among white children (0.02 standard deviation increase) and children of other races (0.04 standard deviation increase). I also observe a negative, significant effect of the CTC on reading skills for black children (0.02 standard deviation decrease). The CTC effect on obesity is only observed among white children (5.5 percentage point reduction), while there is no statistically significant impact on other subgroups. The estimated effects of the CTC on externalizing BPI is statistically significant among white children only. For internalizing BPI, the CTC was associated with an increase of internalizing BPI, and the estimates are statistically significant for white children and children of other races at one percent. These results are expected, as white and Asian children were more likely to re-

[38] See Figure 1 of Goldin and Michelmore (2022).

ceive the full credit relative to black and Hispanic children.

I also examine how children living with married parents and those living with unmarried parents respond differently. The estimated effects of maximum CTC on math scores are similar in magnitude for children with married parents (0.03 standard deviation increase) and children with unmarried parents (0.02 standard deviation increase). The estimated impact of the CTC on almost all outcomes are greater in magnitude and statistically significant among children with married parents. A $1,000 increase in the maximum CTC is associated with a 0.01-standard-deviation increase in reading score, a 6.2-percentage-point decrease in obesity rate, and 0.51-unit decrease in externalizing BPI for children living with married parents. The CTC is associated with higher internalizing BPI, with a greater magnitude among children living with unmarried parents. Overall, I find most of the positive impact of the CTC on child outcomes for children living with married parents. These results are expected as married couple are more likely to receive the full CTC.

5.2 Long-term outcomes

Table 5 presents the estimated effects of childhood CTC exposure on educational outcomes of children in their later life. Panel A presents estimates of equation 2 for educational outcomes. Increased exposure to the CTC during childhood is associated with higher probability of graduating from high school or receiving the GED and a higher probability of graduating from college. A $1,000 increase in the average annual CTC exposure during childhood increases the likelihood of completing high school or receiving the GED by 2.3 percentage points and the likelihood of completing college by 8.7 percentage points. There is no statistically significant association between childhood CTC exposure and the likelihood of completing high school (i.e., when excluding the GED) or having some college experience.

As in Bastian and Michelmore (2018) and Braga et al. (2020), I divide childhood into

three periods to understand how investments in different age intervals may have differential impacts. Panel B of Table 5 presents β_1, β_2, and β_3 in equation 3. For the probability of completing high school degree or receiving the GED certification, CTC exposure when a child is 0-5 years old has a stronger effect with a higher precision (1.2 percentage points, p-value < 0.01) compared to CTC exposure during age 6-12 (0.4 percentage points, p-value < 0.1) or during age 13-16. However, joint test on these coefficients suggests that coefficients on each interval are not statistically different (p-value = 0.62). The joint test results for all other educational outcomes (completing high school degree, some college experience, and completing college) also provides that I cannot conclude that investments during a certain childhood plays a more important role.[39]

In Table 6, I estimate the effects of CTC exposure on average health outcomes between ages 18 and 27.[40] A $1,000 increase in the average annual CTC exposure during childhood increases obesity rate by 2.3 percentage points, but this is statistically significant at 10 percent. For obesity, I also cannot conclude that CTC exposure during a certain age interval is statistically different from others. There is no significant association between childhood CTC exposure and likelihood of reporting very good or excellent health, high blood pressure, depression or lost of interest.

6 Conclusion

This study examines the contemporaneous and long-run impacts of childhood CTC exposure on educational and health outcomes. For contemporaneous outcomes, using time-series variation in the maximum CTC, I find that the CTC improves math and reading skills of children, reduces child obesity, reduces externalizing behavioral problems, while

[39] I measure college completion rate at age 26 and thus the sample for this outcome was born before 1993. As the CTC was implemented in 1998, they were not exposed to the CTC during age of 0-5.

[40] It is important to note that not all individuals are observed until age 27; for example, if an individual just turned 18 at the time of the last wave used in this study (i.e., the 2019 wave), then this individual is only observed once in the TAS waves, and thus the health outcomes of this person would be measured at age 18.

increases internalizing behavioral problems. Analysis by race and ethnicity subgroups suggests that these impacts are most pronounced among white children. I also find that the impact is strong among children of other races. Analysis by marital status of parents provides evidence that most of the impact is driven by children living with married parents rather than children living with unmarried parents.

Using the average annual CTC exposure during childhood, I find that the CTC improves some education outcomes in the long-term. Estimates suggest that a $1,000 increase in CTC exposure when a child was 0-16 years old leads to a 2.3-percentage-point increase in the likelihood of completing high school or receiving the GED and a 8.7-percentage-point increase in the likelihood of completing college. For health outcomes, I only observe significant association between the CTC exposure and obesity. A $1,000 increase in average annual CTC exposure during childhood leads to a reduction in obesity rate by 2.3 percentage points. There is no statistically significant association between CTC exposure and other health outcomes (self-reported health, high blood pressure, depression, or loss of interest).

References

AIZER, A., S. ELI, J. FERRIE, AND A. LLERAS-MUNEY (2016): "The long-run impact of cash transfers to poor families," *American Economic Review*, 106, 935–71.

ANDERSON, P. M., K. F. BUTCHER, AND P. B. LEVINE (2003): "Maternal employment and overweight children," *Journal of health economics*, 22, 477–504.

BASTIAN, J. AND K. MICHELMORE (2018): "The long-term impact of the earned income tax credit on children's education and employment outcomes," *Journal of Labor Economics*, 36, 1127–1163.

BAUM II, C. L. (2003): "Does early maternal employment harm child development? An analysis of the potential benefits of leave taking," *Journal of labor Economics*, 21, 409–448.

BAYDAR, N. AND J. BROOKS-GUNN (1991): "Effects of maternal employment and child-care arrangements on preschoolers' cognitive and behavioral outcomes: Evidence from the Children of the National Longitudinal Survey of Youth." *Developmental psychology*, 27, 932.

BERGER, L., J. BROOKS-GUNN, C. PAXSON, AND J. WALDFOGEL (2008): "First-year maternal employment and child outcomes: Differences across racial and ethnic groups," *Children and Youth Services Review*, 30, 365–387.

BERGER, L. M., S. A. FONT, K. S. SLACK, AND J. WALDFOGEL (2017): "Income and child maltreatment in unmarried families: Evidence from the earned income tax credit," *Review of Economics of the Household*, 15, 1345–1372.

BRAGA, B., F. BLAVIN, AND A. GANGOPADHYAYA (2020): "The long-term effects of childhood exposure to the earned income tax credit on health outcomes," *Journal of Public Economics*, 190, 104249.

BROOKS-GUNN, J., W.-J. HAN, AND J. WALDFOGEL (2002): "Maternal employment and child cognitive outcomes in the first three years of life: The NICHD study of early child care," *Child development*, 73, 1052–1072.

——— (2010): "First-year maternal employment and child development in the first seven years," *Monographs of the Society for Research in Child Development*, 75, 7.

CAMPBELL, F., G. CONTI, J. J. HECKMAN, S. H. MOON, R. PINTO, E. PUNGELLO, AND Y. PAN (2014): "Early childhood investments substantially boost adult health," *Science*, 343, 1478–1485.

CHETTY, R., J. N. FRIEDMAN, N. HILGER, E. SAEZ, D. W. SCHANZENBACH, AND D. YAGAN (2011a): "How does your kindergarten classroom affect your earnings? Evidence from Project STAR," *The Quarterly journal of economics*, 126, 1593–1660.

CHETTY, R., J. N. FRIEDMAN, AND J. E. ROCKOFF (2011b): "The long-term impacts of teachers: Teacher value-added and student outcomes in adulthood," Tech. rep., National Bureau of Economic Research.

CUMMINGS, E. M. AND P. T. DAVIES (1994): "Maternal depression and child development," *Journal of child psychology and psychiatry*, 35, 73–122.

CUNHA, F. AND J. HECKMAN (2007): "The technology of skill formation," *American economic review*, 97, 31–47.

CURRIE, J. AND D. ALMOND (2011): "Human capital development before age five," in *Handbook of labor economics*, Elsevier, vol. 4, 1315–1486.

DAHL, G. B. AND L. LOCHNER (2012): "The impact of family income on child achievement: Evidence from the earned income tax credit," *American Economic Review*, 102, 1927–56.

——— (2016): "Correction and Addendum: The impact of family income on child achievement: Evidence from the earned income tax credit," *Unpublished manuscript*.

——— (2017): "The impact of family income on child achievement: Evidence from the earned income tax credit: Reply," *American Economic Review*, 107, 629–31.

DEARING, E., K. MCCARTNEY, AND B. A. TAYLOR (2009): "Does higher quality early child care promote low-income children's math and reading achievement in middle childhood?" *Child development*, 80, 1329–1349.

DODGE, K. A. (1990): "Developmental psychopathology in children of depressed mothers." *Developmental Psychology*, 26, 3.

DOWNEY, G. AND J. C. COYNE (1990): "Children of depressed parents: an integrative review." *Psychological bulletin*, 108, 50.

DUFFY, D. AND N. SASTRY (2014): "Achievement Tests in the Panel Study of Income Dynamics Child Development Supplement," *PSID Technical Series Papers*, 14–02.

FELFE, C. AND R. LALIVE (2014): "Does early child care help or hurt children's development?" *Available at SSRN 2505346*.

FRONGILLO, E. A., D. F. JYOTI, AND S. J. JONES (2006): "Food stamp program participation is associated with better academic learning among school children," *The Journal of nutrition*, 136, 1077–1080.

GOLDIN, J. AND K. MICHELMORE (2022): "Who Benefits from the Child Tax Credit?" *National Tax Journal*, 75, 000–000.

GOODMAN, S. H. AND I. H. GOTLIB (1999): "Risk for psychopathology in the children of depressed mothers: a developmental model for understanding mechanisms of transmission." *Psychological review*, 106, 458.

HAMAD, R. AND D. H. REHKOPF (2016): "Poverty and child development: a longitudinal study of the impact of the earned income tax credit," *American journal of epidemiology*, 183, 775–784.

HAN, W.-J., J. WALDFOGEL, AND J. BROOKS-GUNN (2001): "The effects of early maternal employment on later cognitive and behavioral outcomes," *Journal of Marriage and Family*, 63, 336–354.

HECKMAN, J., R. PINTO, AND P. SAVELYEV (2013): "Understanding the mechanisms through which an influential early childhood program boosted adult outcomes," *American Economic Review*, 103, 2052–86.

HOFFERTH, S., P. E. DAVIS-KEAN, J. DAVIS, AND J. FINKELSTEIN (1997): "The child development supplement to the Panel Study of Income Dynamics: 1997 user guide,"

Ann Arbor: Survey Research Center, Institute for Social Research, University of Michigan.

HOWES, C., M. BURCHINAL, R. PIANTA, D. BRYANT, D. EARLY, R. CLIFFORD, AND O. BARBARIN (2008): "Ready to learn? Children's pre-academic achievement in pre-kindergarten programs," *Early childhood research quarterly*, 23, 27–50.

HOYNES, H., D. MILLER, AND D. SIMON (2015): "Income, the earned income tax credit, and infant health," *American Economic Journal: Economic Policy*, 7, 172–211.

HOYNES, H., D. W. SCHANZENBACH, AND D. ALMOND (2016): "Long-run impacts of childhood access to the safety net," *American Economic Review*, 106, 903–34.

HOYNES, H. W. AND D. W. SCHANZENBACH (2018): "Safety net investments in children," Tech. rep., National Bureau of Economic Research.

HUSTON, A. C., G. J. DUNCAN, V. C. MCLOYD, D. A. CROSBY, M. N. RIPKE, T. S. WEISNER, AND C. A. ELDRED (2005): "Impacts on children of a policy to promote employment and reduce poverty for low-income parents: new hope after 5 years." *Developmental psychology*, 41, 902.

JIANG, H. ET AL. (2020): "The Effects of the Child Care Tax Credit on Children's Long-term Educational Achievement," Tech. rep., Tulane University, Department of Economics.

JO, Y. (2018): "Does the earned income tax credit increase children's weight? The impact of policy-driven income on childhood obesity," *Health Economics*, 27, 1089–1102.

KANG, H. (2021): "The Child Tax Credit and Labor Market Outcomes of Mothers," *University of Kentucky Center for Poverty Research Discussion Paper Series*.

——— (2022): "The Child Tax Credit and Maternal Health," Tech. rep., University of Kentucky, Department of Economics.

LU, Y., J. W.-J. YEUNG, J. LIU, AND D. J. TREIMAN (2019): "Migration and children's psychosocial development in China: When and why migration matters," *Social science research*, 77, 130–147.

LYKENS, K. A. AND P. A. JARGOWSKY (2002): "Medicaid matters: children's health and

Medicaid eligibility expansions," *Journal of Policy Analysis and Management*, 21, 219–238.

MANOLI, D. AND N. TURNER (2018): "Cash-on-hand and college enrollment: Evidence from population tax data and the earned income tax credit," *American Economic Journal: Economic Policy*, 10, 242–71.

MICHELMORE, K. AND L. M. LOPOO (2021a): "The Effect of EITC Exposure in Childhood on Marriage and Early Childbearing," *Demography*, 58, 2365–2394.

——— (2021b): "Exposure to the Earned Income Tax Credit in early childhood and family wealth," *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 7, 196–215.

MILLIGAN, K. AND M. STABILE (2011): "Do child tax benefits affect the well-being of children? Evidence from Canadian child benefit expansions," *American Economic Journal: Economic Policy*, 3, 175–205.

NELSON, J. R., G. J. BENNER, K. LANE, AND B. W. SMITH (2004): "Academic achievement of K-12 students with emotional and behavioral disorders," *Exceptional children*, 71, 59–73.

PETERSON, J. L. AND N. ZILL (1986): "Marital disruption, parent-child relationships, and behavior problems in children," *Journal of Marriage and the Family*, 295–307.

PILKAUSKAS, N. V., J. BROOKS-GUNN, AND J. WALDFOGEL (2018): "Maternal employment stability in early childhood: Links with child behavior and cognitive skills." *Developmental psychology*, 54, 410.

RENWICK, T. AND L. FOX (2016): "The supplemental poverty measure: 2015," *Current Population Reports*, 1–23.

ROSTAD, W. L., J. KLEVENS, K. A. PORTS, AND D. C. FORD (2020): "Impact of the United States federal child tax credit on childhood injuries and behavior problems," *Children and youth services review*, 109, 104718.

RUHM, C. J. (2008): "Maternal employment and adolescent development," *Labour economics*, 15, 958–983.

SMITH, J. P. (2009): "The impact of childhood health on adult labor market outcomes,"

The review of economics and statistics, 91, 478–489.

TAKAHASHI, E., K. YOSHIDA, H. SUGIMORI, M. MIYAKAWA, T. IZUNO, T. YAMAGAMI, AND S. KAGAMIMORI (1999): "Influence factors on the development of obesity in 3-year-old children based on the Toyama study," *Preventive medicine*, 28, 293–296.

VANDELL, D. L., J. BELSKY, M. BURCHINAL, L. STEINBERG, N. VANDERGRIFT, AND N. E. C. C. R. NETWORK (2010): "Do effects of early child care extend to age 15 years? Results from the NICHD study of early child care and youth development," *Child development*, 81, 737–756.

VANDELL, D. L. AND J. RAMANAN (1992): "Effects of early and recent maternal employment on children from low-income families," *Child development*, 63, 938–949.

VANDERVEN, T. M., F. T. CULLEN, M. A. CARROZZA, AND J. P. WRIGHT (2001): "Home alone: The impact of maternal employment on delinquency," *Social Problems*, 48, 236–257.

WALDFOGEL, J., W.-J. HAN, AND J. BROOKS-GUNN (2002): "The effects of early maternal employment on child cognitive development," *Demography*, 39, 369–392.

YEUNG, W. J., M. R. LINVER, AND J. BROOKS-GUNN (2002): "How money matters for young children's development: Parental investment and family processes," *Child development*, 73, 1861–1879.

Tables

Table 1: Descriptive Statistics (CDS)

Variable	Mean	Standard deviation
Demographics		
Girl	0.50	0.50
White	0.64	0.48
Black	0.15	0.36
Hispanic	0.14	0.34
Married Parents	0.72	0.45
Educational Outcomes		
Applied Problems	104.68	17.02
Letter-word	104.78	17.93
Health Outcomes		
Very Good or Excellent Health	0.85	0.36
Obese	0.19	0.40
BPI (Total)	8.28	6.19
BPI (Externalizing)	5.52	4.03
BPI (Internalizing)	2.94	3.02

Source: 1997, 2002, 2007 waves of the Panel Study of Income Dynamics Child Development Supplement (PSID CDS).
Notes: Educational outcomes are based on Woodcock-Johnson raw scores. Applied Problems subtest measures math skills. Letter-Word Identification subtest measures reading skills. All statistics are weighted by the PSID CDS child level sample weight.

Table 2: Descriptive Statistics (TAS)

Variable	Mean	Standard deviation
Average Annual CTC Exposure (age 0-16)	$894	$866
Average Annual CTC Exposure (age 0-5)	$299	$783
Average Annual CTC Exposure (age 6-12)	$1,121	$1,342
Average Annual CTC Exposure (age 13-16)	$1,218	$1,471
Demographics		
Female	0.50	0.50
White	0.65	0.48
Black	0.15	0.36
Hispanic	0.15	0.36
Mom or Dad Completed High School	0.80	0.40
Fraction of Childhood Years Parents Married	0.74	0.38
Educational Outcomes		
High School Degree or GED Certification (as of age 20)	0.95	0.21
High School Degree (as of age 20)	0.91	0.29
Some College Experience (as of age 24)	0.75	0.43
College Degree (as of age 26)	0.39	0.49
Health Outcomes		
Very Good or Excellent (self-reported health)	0.62	0.39
Obese	0.20	0.36
High Blood Pressure	0.06	0.20
Depression	0.16	0.30
Loss of Interest	0.23	0.35

Source: 1984-2007 waves of Panel Study of Income Dynamics (PSID) and 2005-2019 waves of the PSID Transition into Adulthood Supplement (TAS).
Notes: CTC Exposure variables are 2020 dollars. All statistics are weighted by average individual cross-section weight across the waves of 1997-2019.

Table 3: Effect of the CTC Exposure on Education and Health in the Short-term

Maximum CTC ($1,000)

	All Children	Girls	Boys
	(1)	(2)	(3)
Applied Problems	0.027***	0.023***	0.028***
	(0.004)	(0.005)	(0.006)
Letter-Word Identification	0.011***	0.007	0.012**
	(0.004)	(0.005)	(0.006)
Very good or Excellent Health	0.016	0.003	0.028*
	(0.012)	(0.017)	(0.016)
Obese (BMI $\geq$ 30)	-0.046***	-0.065***	-0.030
	(0.013)	(0.020)	(0.018)
BPI (total)	0.290	0.850**	-0.192
	(0.244)	(0.336)	(0.342)
BPI (externalizing)	-0.497***	-0.150	-0.773***
	(0.160)	(0.219)	(0.226)
BPI (internalizing)	0.753***	1.012***	0.520***
	(0.117)	(0.161)	(0.165)

* $p < .1$, ** $p < .05$, *** $p < .01$

Source: 1997, 2002, 2007 waves of the Panel Study of Income Dynamics Child Development Supplement (PSID CDS).

Notes: Estimates are based on the equation 1. Normalized version of Woodcock-Johnson scores were used. Applied Problems subtest measures math skills of children. Letter-Word Identification subtest measures reading skills. Very good or excellent health is an indicator for primary caregiver reporting child's health as very good or excellent (compared to good, fair, or poor). Obesity is an indicator for a child with BMI 30 or greater. BPI (total) is Behavioral Problem Index (score of 0-30) based on 30 questions that measures children's psychological and behavioral problems. BPI (Externalizing) is based on 16 items about aggressive behaviors, such as anger, sudden changes in mood, and disobedience. BPI (Internalizing) is based on 13 items about withdrawn behaviors, such as anxiousness, sadness, and nervousness. All results are weighted by the PSID CDS child level sample weight. Robust standard errors are presented.

Table 4: Effect of the CTC Exposure on Education and Health in the Short-term by Subgroups

Maximum CTC ($1,000)

	White	Black	Other Races	Hispanic	Married Parents	Unmarried Parents
	(1)	(2)	(3)	(4)	(5)	(6)
Applied Problems	0.029***	0.013*	0.057**	0.032	0.028***	0.021***
	(0.005)	(0.007)	(0.026)	(0.025)	(0.005)	(0.007)
Letter-Word Identification	0.019***	-0.019***	0.042**	-0.023	0.010**	0.010
	(0.005)	(0.007)	(0.019)	(0.024)	(0.005)	(0.007)
Very good or Excellent Health	0.026**	0.051*	-0.037	-0.079	0.015	0.013
	(0.013)	(0.026)	(0.071)	(0.071)	(0.013)	(0.025)
Obese (BMI ≥ 30)	-0.055***	-0.022	-0.005	-0.068	-0.062***	-0.006
	(0.016)	(0.027)	(0.060)	(0.087)	(0.015)	(0.026)
BPI (total)	0.237	0.379	1.602	1.145	0.222	0.562
	(0.276)	(0.536)	(1.009)	(1.447)	(0.276)	(0.483)
BPI (externalizing)	-0.602***	-0.152	0.025	0.210	-0.513***	0.423
	(0.185)	(0.330)	(0.717)	(0.990)	(0.181)	(0.318)
BPI (internalizing)	0.801***	0.471*	1.496***	1.034	0.708***	0.905***
	(0.132)	(0.264)	(0.414)	(0.650)	(0.135)	(0.223)

* $p < .1$, ** $p < .05$, *** $p < .01$

Source: 1997, 2002, 2007 waves of the Panel Study of Income Dynamics Child Development Supplement (PSID CDS).
Notes: Estimates are based on the equation 1 by subgroups of white children, black children, Hispanic children, children with married parents, children with unmarried parents. Normalized version of Woodcock-Johnson scores were used. Applied Problems subtest measures math skills of children. Letter-Word Identification subtest measures reading skills. Very good or excellent health is an indicator for primary caregiver reporting child's health as very good or excellent (compared to good, fair, or poor). Obesity is an indicator for a child with BMI 30 or greater. BPI (total) is Behavioral Problem Index (score of 0-30) based on 30 questions that measures children's psychological and behavioral problems. BPI (Externalizing) is based on 16 items about aggressive behaviors, such as anger, sudden changes in mood, and disobedience. BPI (Internalizing) is based on 13 items about withdrawn behaviors, such as anxiousness, sadness, and nervousness. All results are weighted by the PSID CDS child level sample weight. Robust standard errors are presented.

Table 5: Effect of Childhood CTC Exposure on Education in the Long-term

CTC Exposure ($1,000)	High School or GED	High School Degree	Some College Experience	College Degree
	(1)	(2)	(3)	(4)
Panel A				
Average annual CTC exposure (age 0-16)	0.023**	0.018	0.004	0.087**
	(0.009)	(0.913)	(0.027)	(0.030)
Panel B				
Average annual CTC exposure (age 0-5)	0.012***	-0.001	-0.055	
	(0.011)	(0.014)	(0.046)	
Average annual CTC exposure (age 6-12)	0.004*	0.009	0.051***	0.044*
	(0.009)	(0.010)	(0.020)	(0.025)
Average annual CTC exposure (age 13-16)	0.000	0.001	0.023	0.004
	(0.008)	(0.011)	(0.015)	(0.016)
F-test, coefficients are jointly identical (p-value)	0.621	0.807	0.141	0.183
Observations	3,877	3,877	2,748	1,886
Mean dependent variable	0.95	0.91	0.75	0.39

* $p < .1$, ** $p < .05$, *** $p < .01$

Source: 1984-2019 waves of Panel Study of Income Dynamics (PSID) and 2005-2019 waves of the PSID Transition into Adulthood Supplement (TAS). Notes: Estimates are based on the equation 2 for Panel A and equation 3 for Panel B. The GED and high school degree outcomes are measured as of age 20. Some college experience is measured as of age 24. College degree is measured as of age 26. All statistics are weighted by average individual cross-section weight across the waves of 1997-2019. Robust standard errors are presented.

Table 6: Effect of Childhood CTC Exposure on Health in the Long-term

CTC Exposure ($1,000)

	Very Good or Excellent Health	Obese (BMI ≥ 30)	High Blood Pressure	Depression (≥ 2 weeks)	Loss of Interest (≥ 2 weeks)
	(1)	(2)	(3)	(4)	(5)
Panel A					
Average annual CTC exposure (age 0-16)	-0.001	0.023*	0.004	0.006	0.012
	(0.014)	(0.014)	(0.008)	(0.011)	(0.013)
Panel B					
Average annual CTC exposure (age 0-5)	0.015	-0.001	0.006	0.013	0.017
	(0.016)	(0.015)	(0.009)	(0.013)	(0.015)
Average annual CTC exposure (age 6-12)	0.015	0.016	0.002	-0.022**	-0.021*
	(0.012)	(0.012)	(0.008)	(0.009)	(0.011)
Average annual CTC exposure (age 13-16)	0.015	0.003	-0.002	0.007	0.006
	(0.012)	(0.012)	(0.007)	(0.009)	(0.011)
F-test, coefficients are jointly identical (p-value)	0.998	0.612	0.754	0.031	0.087
Observations	4,475	4,454	4,473	4,472	4,473
Mean dependent variable	0.62	0.20	0.06	0.16	0.23

* $p < .1$, ** $p < .05$, *** $p < .01$

Source: 1984-2019 waves of Panel Study of Income Dynamics (PSID) and 2005-2019 waves of the PSID Transition into Adulthood Supplement (TAS).
Notes: Estimates are based on the equation 2 for Panel A and equation 3 for Panel B. All outcomes are measured as averages between ages 18 and 27. All statistics are weighted by average individual cross-section weight across the waves of 1997-2019. Robust standard errors are presented.

Data Appendix (Not for Publication)

Table A1: Behavioral Problem Index Factors

Question	External	Internal	Total
(He/She) has sudden changes in mood or feeling.	X		X
(He/She) feels or complains that no one loves him/her.		X	X
(He/She) is rather high strung and nervous.	X		X
(He/She) cheats or tells lies.	X		X
(He/She) is too fearful or anxious.		X	X
(He/She) argues too much.	X		X
(He/She) has difficulty concentrating, cannot pay attention for long.	X		X
(He/She) is easily confused, seems to be in a fog.		X	X
(He/She) bullies or is cruel or mean to others.	X		X
(He/She) is disobedient.	X		X
(He/She) does not seem to feel sorry after (he/she) misbehaves.	X		X
(He/She) has trouble getting along with other children.	X	X	X
(He/She) is impulsive, or acts without thinking.	X		X
(He/She) feels worthless or inferior.		X	X
(He/She) is not liked by other children.		X	X
(He/She) has difficulty getting (his/her) mind off certain thoughts.		X	X
(He/She) is restless or overly active, cannot sit still.	X		X
(He/She) is stubborn, sullen, or irritable.	X		X
(He/She) has a very strong temper and loses it easily.	X		X
(He/She) is unhappy, sad or depressed.		X	X
(He/She) is withdrawn, does not get involved with others.		X	X
(He/She) breaks things on purpose or deliberately destroys (his/her) own or another's things.	X		X
(He/She) clings to adults.	*	*	X
(He/She) cries too much.	X		X
(He/She) demands a lot of attention.	X		X
(He/She) is too dependant on others.		X	X
(He/She) feels others are out to get (him/her).		X	X
(He/She) hangs around with kids who get into trouble.	*	*	X
(He/She) is secretive, keeps things to (himself/herself).		X	X
(He/She) worries too much.		X	X
Number of items	16	13	30

*Not included in the scale.

Source: Hofferth et al. (1997)