

CASH FOR CALM: DID THE 2021 CHILD TAX CREDIT (CTC) EASE MENTAL
HEALTH WOES?

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ABSTRACT

Defined by foreign conflicts, financial crises, unaffordability, and a global public health emergency, this century has exposed the mental health vulnerabilities of U.S. households. Yet mental health remains an overlooked priority in policymaking. Could direct cash transfers offer a pathway to relief? Amid a global pandemic and a period of economic uncertainty, the American Rescue Plan Act of 2021 (ARP) introduced historic investments in the American people. Among the most significant was the temporary expansion of the Child Tax Credit (CTC), which, for the first time, was disbursed as an advance monthly payment from July to December 2021. This thesis examines whether the expanded CTC helped mitigate the likelihood of reported anxiety using a Difference-in-Differences (DID) approach to estimate the Intent-to-Treat (ITT) effect of eligibility. Contrary to expectations, the findings show a modest but statistically significant increase in reported anxiety among eligible households following the policy's rollout. However, subgroup analyses revealed that certain groups, specifically single-parent households, non-college-educated individuals, and low-income families, experienced smaller increases in the likelihood of reporting anxiety relative to their counterparts. These results suggest that while broad-based cash assistance may not uniformly reduce psychological stress, its impact can vary meaningfully depending on a household's baseline economic

vulnerability. Taken together, the findings highlight both the limitations and the potential of income support programs to influence household well-being during periods of crisis.

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For Grace, Annett, Mom, and Dad.

Many thanks,
Nissishalom Cantu

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INTRODUCTION

Mental health is shaped by a complex web of individual, social, and structural factors that interact throughout a lifetime to safeguard or jeopardize well-being. Social and environmental challenges, such as poverty, violence, inequality, and deprivation, are particularly detrimental, especially during formative developmental stages like early childhood. Risks to mental health manifest on multiple levels, from local issues affecting individuals and families to global crises such as economic downturns, pandemics, humanitarian emergencies, and climate change, which impact entire populations (WHO, 2022). The COVID-19 pandemic exacerbated an already existing mental health epidemic, intensifying challenges for individuals and communities worldwide (WHO, 2022). According to four Pew Research Center surveys conducted between March 2020 and September 2022, at least four in ten U.S. adults reported experiencing high levels of psychological distress during the pandemic (Gramlich, 2023). This phenomenon was more prevalent among individuals aged 18 to 29, women, and individuals in low-income households. The World Health Organization (WHO) found that rates of already common conditions such as depression and anxiety, shot up by over 25% within the first year of the COVID-19 pandemic (WHO, 2022). This alarming rise in mental health challenges underscores the importance of meaningful investment and action in this area. The consequences of inaction are staggering. Abramson, Boerma, and Tsyvinski (2024) estimate that the annual cost of mental health, particularly its impact on consumption, savings, portfolio choice, and labor supply, to the U.S. economy is \$282 billion, equivalent to the impact of an average economic downturn (Abramson et al., 2024). Another estimate presents an even more unsettling figure. In a study by the Deloitte

Health Equity Institute and the School of Global Health at Meharry Medical College, excess costs stemming from mental health inequities, driven by systemic barriers such as unequal access to care, social determinants of health, and structural racism, are projected to total approximately \$477.5 billion in 2024 (Dawes et al., 2024). Further significance of mental health challenges can manifest in the workplace. According to the same study, the total cost of productivity losses due to mental health inequities is projected to more than double from \$116 billion in 2024 to \$252.3 billion in 2040, with unemployment being the largest contributor. De Oliveira, Saka, Bone, and Jacobs (2022) conducted a review of studies published in MEDLINE and EconLit from January 1, 2008, to May 31, 2020. Their objective was to explore the connection between mental health and lost productivity. The review revealed a clear link between poor mental health, often measured as depression or anxiety, and reduced workplace productivity, reflected in higher rates of absenteeism and presenteeism (de Oliveira et al., 2022).

Financial strain, specifically in the form of poverty or income insecurity, is a well-documented risk factor for mental health challenges such as anxiety and depression (Ryu and Fan 2022). The expansion of the CTC under the ARP sought to alleviate this very strain by providing families with direct financial support. By increasing the CTC from \$2,000 to up to \$3,600 per child, the ARP aimed not only to reduce poverty but also to buffer families during a time associated with a public health crisis and economic uncertainty.

Using data from the U.S. Census Household Pulse Survey, this analysis employs a Difference-in-Differences (DID) approach to estimate the impact of the expanded CTC on the likelihood of reported anxiety during a period of public health and economic

uncertainty. The study defines the treatment group as households with children, eligible for the CTC, and the control group as similarly situated households without children. In addition to estimating the overall effect, the analysis also investigates whether the impact varied across subgroups, including single-parent households, non-college-educated individuals, and low-income families. This allows for a meticulous understanding of how targeted financial interventions may intersect with mental health outcomes across different household types. As mental health inequities continue to impose widespread social and economic costs, evaluating the reach and responsiveness of policies like the CTC is essential for designing more effective support systems.

BACKGROUND

In response to the COVID-19 pandemic and the economic crisis that followed, the Biden-Harris Administration outlined a series of policy goals that culminated in the ARP (White House 2021). At the core of the response was delivering financial relief to American families through \$1,400 per-person checks, also known as Economic Impact Payments (EIP), the extension of unemployment insurance, an increase in Supplemental Nutrition Assistance Program (SNAP) benefits, and the channeling of the tax code to expand programs such as the Earned Income Tax Credit (EITC) and, as previously mentioned, the CTC.

Under the ARP, the CTC was significantly expanded and altered. Solely for tax year 2021, the maximum credit increased to \$3,600 per child under age 6 and increased to \$3,000 for children aged 6 to 17. Additionally, the credit was made fully refundable, allowing it to be claimed even without earned income or if a tax unit didn't owe any income taxes. The ARP also extended eligibility to include children up to age 17.

Furthermore, the ARP introduced a groundbreaking feature: for the first time in its history, the CTC under the ARP allowed eligible households to receive half of the calculated 2021 credit through monthly advance payments from July to December 2021, as opposed to waiting until tax filing season to claim the full credit.

The Delivery of the American Rescue Plan Child Tax Credit

While the expanded CTC marked a historic policy shift, its effectiveness depended not only on its design but also on how it was delivered. Under the ARP, most eligible families automatically began receiving monthly payments between July and December 2021, based on information from prior tax filings in 2019 or 2020. However, this administrative framework introduced a major limitation: families who had not filed recent tax returns, or who had not registered with the IRS through tools like the non-Filer Portal, were not automatically enrolled (IRS, 2021). Instead, these households had to actively claim the credit when filing their 2021 tax returns, creating barriers for many of the lowest-income families the policy aimed to reach.

Recognizing this challenge, the Biden-Harris Administration launched outreach efforts such as Child Tax Credit Awareness Day to raise visibility and promote enrollment among non-filers (The White House, 2021). Tools like Letter 6419, sent by the IRS, and the Child Tax Credit Update Portal were intended to support reconciliation and access, but their usefulness hinged on awareness and digital literacy. Ultimately, while the advanced monthly delivery of the CTC represented an important step toward more accessible and responsive income support, uneven enrollment and access limited its full potential. As discussed later in the analysis, a relatively high non-compliance among eligible households likely contributed to discrepancies between the policy's intent and its

actual delivery, underscoring the significance of designing benefit systems that are easy to navigate.

American Rescue Plan vs. Tax Cuts and Jobs Act

The changes to the CTC under the ARP occurred against the baseline status established by the Tax Cuts and Jobs Act of 2017 (TCJA). Lost in the background of one of the most consequential and comprehensive tax reform packages in U.S. history was the modification of the CTC under the Trump Administration. The TCJA introduced several temporary modifications to the CTC, effective from 2018 through 2025. These changes increased the maximum credit amount to \$2,000 per child and adjusted the procedure for low-income families, allowing 15% of earned income over \$2,500, with a refundable portion capped at \$1,400 per child, adjusted for inflation. Additionally, the income threshold for the credit phaseout was raised to \$400,000 for married joint filers and \$200,000 for single and head-of-household filers. The credit was only partially refundable, meaning taxpayers needed to have a certain level of earned income to claim the full credit. Specifically, eligibility for the refundable portion of the credit required at least \$2,500 in earned income. Furthermore, the phase-in and phase-out thresholds for the credit under the TCJA were less generous compared to the later modification under the ARP. In 2022, the ARP CTC provisions expired and reverted to the TCJA structure.

LITERATURE REVIEW

Researchers have studied the 2021 ARP version of the CTC alongside other types of cash transfers, both conditional and non-conditional. These studies also explored how such policies affect employment and uncover potential long-term advantages, like greater investments in education and nutrition by recipients (Chetty et al. 2011; Rook et al.

2023). The vast body of research suggests that cash transfers provide critical financial support that fosters recipients to meet immediate needs and improve their quality of life (Aizer et al. 2017; Pilkauskas et al. 2022).

The COVID-19 pandemic ushered in a brief period of re-imagination in fiscal policy, specifically with the proliferation of cash transfers as governments sought to keep their economies afloat as stay-at-home policies fostered a brief period of economic downturn due to a relaxed demand for goods and services. In his World Bank's Social Safety Nets Global Solutions Group report, Gentilini (2022) found that these efforts were particularly present among high-income countries, as their global coverage of cash transfers was about 44%. Altogether, it's estimated that around 1.36 billion people, roughly one in every six individuals worldwide, received at least one cash transfer during the pandemic according to Gentilini.

The Anti-Poverty Effects of In-Cash Transfer Programs

The CTC provisions under the ARP also had vast benefits in the reduction of child poverty. Burns and Fox (2022) estimate that the CTC lifted 2.9 million children out of poverty. This finding aligns with an analysis by Hardy, Collyer, and Wimer (2023), that found that the reduction in child poverty was found across both high- and low-cost-of-living states. However, states with lower costs of living and higher baseline poverty rates experienced the greatest reductions in child poverty. Another study examined how families used the monthly CTC advance payments. Families receiving monthly payments experienced a 20% reduction in food insufficiency relative to those who received lump-sum payments. Interestingly, lump-sum payments more effectively alleviated housing challenges, such as falling behind on rent (Parolin et al., 2022).

Looking beyond the U.S., Crosta et al. (2024) highlight that Unconditional Cash Transfer (UCT) programs in both low and middle-income countries that incorporate child-focused framing, lead to stronger outcomes on total consumption, food security, and psychological well-being.

The Relationship Between Poverty and Mental Health

Multiple studies have explored the connection between mental health and factors such as household income, poverty, unemployment, and economic shocks, highlighting their influence on mental health outcomes. For instance, one study involving non-institutionalized adults conducted interviews at two separate points, three years apart, to examine the relationship between fluctuations in household income and mental health outcomes. The findings concluded that a decrease in household income between the two-time points was associated with a higher risk of developing mood, anxiety, or substance use disorders (Sareen et al. 2011). A review of 115 studies revealed a clear connection between the social and economic conditions associated with poverty and the prevalence of common mental disorders, including depression and anxiety in low- and middle-income countries (Lund et al. 2016). The effect of unemployment also serves as a channel to worsening mental health. One analysis reveals that poor mental health is both a consequence and a predictor of unemployment, highlighting the bi-directional relationship between these two factors. Specifically, individuals with poor mental health are at an increased risk of unemployment, while unemployment can further exacerbate mental health issues, contributing to a vicious cycle. (Olesen et al. 2013).

The Relationship Between In-Cash Transfer Programs and Mental Health

A recent systematic review by Ridley et al. (2020) sheds light on how programs like cash transfers can play a crucial role in improving mental health by reducing financial stress and helping individuals navigate economic instability. The review also highlights the interconnected nature of poverty and mental health, showing that mental illness can lead to reduced employment and income, creating a cycle of economic hardship. Furthermore, it points out that events like the COVID-19 pandemic have intensified mental health challenges, such as depression and anxiety, making targeted interventions like cash transfers even more vital for promoting emotional well-being and stability. In another analysis, a randomized control trial (RCT) in Kenya discovered that households receiving cash transfers demonstrated increased consumption, greater asset accumulation, and higher revenue, alongside improved psychological well-being (Haushofer et al. 2020). Similarly, an RCT of Mali's national cash transfer program, Filets Sociaux (Jigisèmèjiri), found that recipients experienced reduced financial worry and stress, improved self-esteem, and increased savings and investments. The study noted that psychological benefits, particularly reduced stress and higher self-esteem, may mediate economic outcomes, suggesting a pathway through which cash transfers can promote both mental and economic well-being (Hidrobo et al., 2023).

CONCEPTUAL FRAMEWORK

This analysis assesses the effect of the 2021 ARP CTC on mental health outcomes, specifically the likelihood of self-reported anxiety among households with and without children. The hypothesis is that eligibility for (and intended receipt) monthly CTC payments helps alleviate financial distress, which, in turn, improves psychological

well-being. Households with children, targeted by the policy, are expected to experience a reduction in mental health strain relative to households without children.

The dependent variable in this analysis, anxiety, is measured as a binary indicator of whether the respondent reports experiencing symptoms of anxiety in the past two weeks. Though self-reported, this measure reflects real concerns about well-being and can serve as a useful proxy for comprehending broader mental health trends, especially during a period that consisted of a once-in-generation global pandemic and rising inflation.¹ The underlying assumption is that financial relief through the CTC payments reduces the likelihood of reported anxiety. This relationship has practical implications for policymaking, particularly in how financial assistance programs can influence psychological well-being.

In addition to the central association between CTC eligibility and reported anxiety, this analysis controls for several factors that may confound this association. Physical limitations, such as difficulties with seeing, hearing, and mobility, are likely to amplify the stress of financial insecurity. For example, individuals facing mobility challenges may experience additional difficulties in securing and maintaining employment (BLS, 2022), which can compound the effects of financial strain on mental health.

Additionally, this analysis considers the role of other cash assistance and safety net programs such as SNAP, which provides financial assistance to households experiencing financial hardship. This particular program interacts with the populations of

¹ Inflation reached a high of 7% on a Year-Over-Year (YOY) basis in December 2021, as reported by the U.S. Bureau of Labor Statistics. Source: U.S. Bureau of Labor Statistics, Consumer Price Index by Category, available at <https://www.bls.gov/charts/consumer-price-index/consumer-price-index-by-category-line-chart.htm>."

interest in meaningful ways. For households with children (the treatment group), SNAP benefits may have strengthened the financial relief provided by the CTC expansion, helping to alleviate stress associated with food insecurity or urgent financial needs. For households without children (the control group), these programs likely provided some level of support but could not fully replicate the comprehensive financial benefits of the expanded CTC. The interaction between this program and financial relief from the CTC underscores how a more generous safety net can reduce financial strain and improve mental health outcomes, particularly among vulnerable groups. For example, recent research reveals that while single mothers are more likely to experience mental health challenges and stress-related health behaviors such as daily smoking and heavy drinking, a more generous safety net, particularly through tax credits, cash benefits, and food assistance, can reduce psychological distress and risky behaviors (Schmidt et al., 2023).

Finally, demographic factors such as educational attainment, marital status, and household composition are included for the reasoning that they can provide context for understanding the financial pressures households may face. For example, single-parent households may experience greater financial strain than two-parent households, which in turn likely affects mental health.

DATA AND METHODS

This analysis uses data from the U.S. Census Household Pulse Survey (HPS), a rapid-response, nationally representative survey designed to collect data on how U.S. households are experiencing emergent economic and social challenges. The HPS offers near-real-time insights into household conditions, including employment, financial strain, and mental health, making it uniquely suited for evaluating the short-term impacts of the

2021 CTC under the ARP. The study sample includes adults aged 18 and older who completed the mental health module and provided complete data on relevant covariates.

The population of interest comprises both households with children and households without children, as these groups were differentially targeted by the 2021 ARP CTC. Households with children serve as the treatment group, while childless households serve as the control group. To improve comparability, both groups were restricted to respondents whose birth year fell within ± 4 years of the median birth year among respondents in child households. The median birth year was 1978; thus, the treatment and control groups include household heads aged 39 to 47 in 2021. This life-stage matching strategy helps reduce bias stemming from age-related differences in anxiety or other life circumstances. Eligibility for the CTC was defined based on the presence of children under 18 in the household, while a separate indicator captures whether the household reported receiving the credit during the post-treatment period.

This study estimates the Intent-to-Treat (ITT) effect using a Difference-in-Differences (DID) framework. The model compares changes in the likelihood of reported anxiety between eligible and ineligible households before (weeks 28-33) and after (weeks 34-41) the CTC rollout. The key outcome, anxiety, was originally a four-category ordinal variable indicating a frequency of anxiety over the past two weeks. For this analysis, it was recoded into a binary indicator equal to 1 if the respondent reported feeling anxious on several days or more (i.e., values greater than 1), and 0 otherwise. The DID regression is specified as follows:

$$Anxiety_{it} = \beta_0 + \beta_1 Post_t + \beta_2 CTC_{it} + \beta_3 (Post \times CTC)_{it} + X_{it\gamma} + \epsilon_{it}$$

Where:

- $Anxiety_{it}$ represents anxiety for individual i at time t ,
- $Post_t$ is a binary indicator for whether the observation is post-treatment,
- CTC_{it} is a binary variable indicating whether the individual is eligible for the Child Tax Credit,
- $(Post \times CTC)_{it}$ is the interaction term that allows us to estimate the causal effect of CTC eligibility on self-reported anxiety,
- X_{it} is a vector of control variables, including factors like physical and cognitive limitations, and safety net program participation,
- ϵ_{it} is the error term

The DID method is particularly well-suited and effective for this analysis since it enables a quasi-experimental estimation of the causal impact of the expanded CTC on mental health outcomes. By comparing changes in the likelihood of reported anxiety between eligible and ineligible households before and after the CTC rollout, DID isolates the differential effect of the policy, net of common time trends. Crucially, DID controls for time-invariant differences between groups (e.g., baseline differences between households with and without children) as well as temporal shocks that affect all households (e.g., inflation, COVID-19 case surges). As such, the DID framework provides a strategy for estimating policy effects in observational data, relying on the identifying assumption that, in the absence of treatment, trends in outcomes for the treatment and control groups would have moved in parallel over time. While the parallel trends assumption cannot be directly proven, it can be assessed for plausibility using pre-treatment data. In this analysis, event-study models are used to examine trends in reported anxiety prior to the implementation of the CTC. The absence of sharp divergences in these trends lends

support to the validity of the assumption, although some modest differences suggest it may only hold approximately.

In constructing the dataset, the analysis uncovered evidence of non-compliance: among eligible households in the post-treatment period, approximately 36.92% reported not receiving the CTC. This discrepancy may reflect awareness gaps or administrative barriers tied to program delivery, such as the requirement to file 2019 or 2020 tax returns or use the IRS Non-Filer Portal. This non-compliance highlights the distinction between eligibility and actual receipt, and the corresponding analysis focuses on ITT rather than Treatment-on-the-Treated effects.

To further explore how the policy's impact varied across demographic groups, this analysis includes subgroup Difference-in-Differences and event-study models for:

- Single-parent vs. two-parent households (based on the number of adults and children),
- Non-college vs. college-educated households (based on highest educational attainment),
- Low-income vs. higher-income households, defined using Census income brackets with a cutoff at $\leq \$58,020$.

Each subgroup analysis is restricted to CTC-eligible households and evaluates whether anxiety trends diverged by group after implementation. These models provide insight into the heterogeneous psychological impact of the CTC, highlighting which households may have experienced the greatest mental health benefits or buffering effects.

Table 1. Variable Definitions

Variable	Definition
Dependent Variable	
<i>Anxiety</i>	This variable measures the presence of anxiety over the past two weeks. It is coded as a binary variable: "0" for "Not at all" and "1" for "Some severity of anxiety" (which includes responses for "Several days," "More than half the days," and "Nearly every day").
Independent Variables	
<i>Child Tax Credit Eligibility</i>	This binary variable indicates whether a respondent was eligible for the expanded Child Tax Credit (CTC) based on having at least one child under age 18 in the household. A value of "1" denotes CTC eligibility, while "0" indicates ineligibility.
<i>Single-Parent Household</i>	This binary variable identifies whether the respondent resides in a single-parent household. A value of "1" denotes households with at least one child under age 18 and only one adult present, while "0" indicates all other household types. This variable captures a subgroup often associated with heightened financial and caregiving burdens.
<i>Non-College-Educated Household</i>	This binary variable indicates whether the respondent has not completed a college degree. A value of "1" denotes respondents with a high school diploma or less, including those with some college but no degree, while "0" represents respondents with an associate's degree or higher. This classification is used to assess variation in responses to the CTC based on educational attainment.
<i>Low-Income Household</i>	This binary variable captures whether the respondent's total pre-tax household income falls at or below \$58,020 annually. A value of "1" designates low-income households, while "0" indicates households with income above this threshold. This definition is consistent with U.S. Census classifications for low-income status.
Safety Net Program and Cash Assistance Participation	
<i>SNAP Receipt</i>	This binary variable indicates whether the respondent received Supplemental Nutrition Assistance Program (SNAP) benefits, coded as "1" for receipt and "0" for non-receipt.
Physical Limitations	

Table 1 (Cont.)

Variable	Definition
<i>Difficulty with hearing</i>	This binary variable indicates whether the respondent reported any hearing difficulty, coded as “1” for some severity of difficulty and “0” for no difficulty.
<i>Difficulty with mobility</i>	This binary variable indicates whether the respondent reported any mobility difficulty, coded as “1” for some severity of difficulty and “0” for no difficulty.
<i>Difficulty with seeing</i>	This binary variable indicates whether the respondent reported any seeing difficulty, coded as “1” for some severity of difficulty and “0” for no difficulty.
Demographic Characteristics	
<i>Household Income Category</i>	<p>A categorical variable representing total pre-tax annual household income, self-reported by the respondent. Income is grouped into eight discrete brackets, coded as follows:</p> <p>1 = Less than \$25,000 2 = \$25,000 - \$34,999 3 = \$35,000 - \$49,999 4 = \$50,000 - \$74,999 5 = \$75,000 - \$99,999 6 = \$100,000 - \$149,999 7 = \$150,000 - \$199,999 8 = \$200,000 and above</p> <p>This variable is used both descriptively and analytically to assess variation in outcomes across income levels and to define subgroups such as low-income households (coded as income levels 1-4, ≤ \$58,020, based on U.S. Census thresholds).</p>
<i>Marital Status</i>	<p>A categorical variable denoting the respondent’s current marital status, coded as:</p> <p>1 = Now married, 2 = Widowed, 3 = Divorced, 4 = Separated, 5 = Never married.</p>
<i>Educational Attainment</i>	<p>A categorical variable indicating the highest level of education completed by the respondent. Values are coded as:</p> <p>1 = Less than high school 2 = Some high school 3 = High school graduate or equivalent, 4 = Some college (no degree)</p>

Table 1 (Cont.)

Variable	Definition
	5 = Associate's degree 6 = Bachelor's degree 7 = Graduate degree.
<i>Male</i>	A binary variable indicating the respondent's gender, derived from the HPS gender question. Coded as 1 = Male and 0 = Female.
<i>Race (White)</i>	Binary variable where "1" = White and "0" = Non-White.
<i>Hispanic Origin</i>	Binary variable: "1" = Hispanic/Latino origin; "0" = Not of Hispanic/Latino origin.
Household Composition	
<i>Household Size</i>	This variable measures the total number of people in the household, including both adults and children.

DESCRIPTIVE RESULTS

The descriptive statistics provide a comprehensive overview of the sample, which includes 703,663 observations. The primary dependent variable, *anxiety*, was originally measured on a four-point scale ranging from 1 ("Not at all") to 4 ("Nearly every day"). For clarity and to facilitate binary outcome modeling, this variable was transformed into a binary indicator: a value of 1 represents some severity of anxiety (i.e., responses 2-4), and a value of 0 reflects no reported anxiety (response 1). Based on this transformation, 53.24% of respondents reported some level of anxiety, while 46.76% reported none. The key independent variable, *eligibility for the CTC*, reveals that 31.39% of the sample were eligible overall, and 31.17% were eligible in the post-treatment period. To explore heterogeneity in treatment effects, several subgroup indicators were examined. Only 4.64% of respondents were in *single-parent households*, while 31.94% lived in *non-*

college-educated households. Just over half the sample (53.47%) fell into the *low-income category*, defined as households with incomes at or below \$58,020.

Among control variables, physical limitations were captured through self-reported *difficulty seeing, hearing, and mobility*. Difficulty seeing was reported by 30.14% of respondents, hearing by 16.50%, and mobility challenges by 23.12%. In terms of *household income*, responses were distributed across income brackets, with the largest shares in the \$100,000-\$149,999 (18.55%) and \$50,000-\$74,999 (17.04%) ranges. Participation in safety net program(s) was relatively low, as only 7.42% of respondents reported receiving *SNAP benefits*. In terms of *educational attainment*, the majority of respondents had completed at least some post-secondary education: 20.22% had some college without a degree, 10.29% held an associate's degree, 29.95% had a bachelor's degree, and 27.83% a graduate degree. Together, 88.29% of respondents reported at least some college education. For *marital status*, 58.60% of respondents reported being married, while smaller proportions were divorced (15.70%), never married (18.46%), widowed (5.55%), or separated (1.69%). *Race and ethnicity* data revealed that 83.43% of respondents identified as white, and 8.45% identified as Hispanic. Finally, *household size* ranged from 1 to 10, with 2-person households being the most common (40.03%). These descriptive statistics of the dataset underscore the diversity in demographic, economic, and household characteristics in the sample.

Table 2. Descriptive Statistics

Variable	Frequency	Percentage
	(n)	(%)
<i>Anxiety</i>		
Yes	374,604	53.24
No	329,059	46.76
<i>Child Tax Credit Eligibility (Overall)</i>		
Yes	220,887	31.39
No	482,776	68.61
<i>Child Tax Credit Eligibility (Post-Treatment)</i>		
Yes	124,925	31.17
No	275,810	68.83
<i>Single-Parent Household</i>		
Yes	32,639	4.64
No	671,024	95.36
<i>Non-College-Educated Household</i>		
College-Educated Household	478,936	68.06
Non-College Household	224,727	31.94
<i>Low-Income Household</i>		
Yes (\leq \$58,020)	327,448	53.47
No ($>$ \$58,020)	376,215	46.53
<i>Difficulty with seeing</i>		
Yes	225, 204	30.14
No	521, 774	69.86
<i>Difficulty with hearing</i>		
Yes	123, 269	16.50
No	623, 709	83.50
<i>Difficulty with mobility</i>		
Yes	172, 713	23.12
No	574, 265	76.88

Table 2 (Cont.)

Variable	Frequency	Percentage
	(n)	(%)
<i>SNAP Receipt</i>		
Yes	55,433	7.42
No	691,545	92.58
<i>Race (White)</i>		
White	587,035	83.43
Non-White	116,628	16.57
<i>Hispanic Origin</i>		
Yes	59,481	8.45
No	644,182	91.55
<i>Household Income Category</i>		
Less than \$25,000	73,623	10.46
\$25,000 - \$34,999	60,104	8.54
\$35,000 - \$49,999	73,818	10.49
\$50,000 - \$74,999	119,903	17.04
\$75,000 - \$99,999	101,530	14.43
\$100,000 - \$149,999	130,513	18.55
\$150,000 - \$199,999	64,811	9.21
\$200,000 and above	79,361	11.28
<i>Educational Attainment</i>		
Less than high school	3,351	0.48
Some high school	7,394	1.05
High school graduate or equivalent	71,723	10.19
Some college, but degree not received	142,259	20.22
Associate's degree	72,378	10.29
Bachelor's degree	210,754	29.95

Table 2 (Cont.)

Variable	Frequency	Percentage
	(n)	(%)
Graduate degree	195,804	27.83
<i>Marital Status</i>		
Now married	412,332	58.60
Widowed	39,081	5.55
Divorced	110,485	15.70
Separated	11,868	1.69
Never married	129,897	18.46
<i>Household Size</i>		
1	130,672	18.57
2	281,696	40.03
3	117,262	16.66
4	100,981	14.35
5	43,771	6.22
6	17,372	2.47
7	6,161	0.88
8	2,645	0.38
9	986	0.14
10	2,117	0.30

REGRESSION RESULTS

This section presents the findings from the DID analysis, which examines how the expanded CTC affected household anxiety levels. As mentioned previously, the analysis estimates the Intent-to-Treat (ITT) effect, defining treatment as CTC eligibility, meaning the respondent reports at least one person under the age of 18 in their household. The findings provide insight into how changes in financial circumstances, receipt of government assistance, and demographic and household composition may have

influenced self-reported anxiety. To assess the impact of the CTC more thoroughly, this section discusses both traditional DID regression results and an event-study analysis, which captures how anxiety evolved on a week-by-week basis in the lead-up to and aftermath of the policy's implementation. Table 3 presents the traditional DID regressions and event-study DID regression results.

Difference-in-Differences (DID) Results

The traditional DID results without controls indicate that CTC-eligible households experienced a modest but statistically significant increase in anxiety following the policy's rollout, relative to ineligible households. The interaction term between the post-treatment period and CTC eligibility (0.024, $p < 0.01$) corresponds to a 2.4 percentage point increase in the likelihood of reporting anxiety. Given that the dependent variable is binary (anxious or not), this suggests a modest increase in self-reported anxiety among eligible households after the policy's implementation. While the magnitude is relatively small, it is notable that the estimated difference in baseline anxiety between households with and without children, captured by the coefficient on CTC eligibility alone, is statistically significant and associated with a decline in the probability of reporting anxiety (-0.033 , $p < 0.01$). This indicates that, even before the policy went into effect, CTC-eligible households were 3.3 percentage points less likely to report anxiety than ineligible ones. This finding is somewhat counterintuitive, as families with children often face heightened financial responsibilities and caregiving demands that typically contribute to stress. Additionally, the coefficient on the post-treatment period (0.057, $p < 0.01$) suggests that anxiety levels increased across all households during the post-policy period, regardless of eligibility. This broader increase may reflect external

stressors, such as inflation or lingering pandemic effects in 2021, that contributed to rising household anxiety more generally.

When incorporating controls such as income, education, marital status, gender, household size, and SNAP receipt, the estimated effect of CTC eligibility on the likelihood of reporting anxiety in the post-treatment period remains statistically significant and essentially unchanged at 0.025. This suggests that demographic and financial characteristics explain part, but not all, of the observed increase, implying that the effect associated with the CTC policy persists even after accounting for household composition and socioeconomic status.

Interpretation of Key Coefficients

CTC Eligibility and Anxiety (ITT Effect)

The regression results suggest that, even before CTC payments were distributed, eligible households exhibited slightly higher levels of anxiety than ineligible households. The coefficient on CTC eligibility (0.008) indicates a 0.8 percentage point increase in the likelihood of reporting anxiety among eligible households in the pre-treatment period, though this estimate is not statistically significant. This finding may reflect preexisting financial stress or other structural differences between families with and without children. Following the implementation of the expanded CTC, the interaction term between the post-treatment period and CTC eligibility (0.025, $p < 0.001$) suggests a modest but statistically significant increase in anxiety among eligible households relative to ineligible ones. Although this effect is measurable, its size, equivalent to a 2.5 percentage point increase in the likelihood of being anxious, is relatively small. This implies that

while the CTC may have had some influence, broader external factors also contributed to household anxiety during this period

Economic Predictors of Anxiety

Household income was a strong and consistent predictor of lower reported anxiety. Compared to the reference group, households earning less than \$25,000, each successively higher income category was associated with a statistically significant decrease in the likelihood of reporting anxiety. For example, households earning between \$35,000 and \$49,999 were 2.4 percentage points less likely to report anxiety ($p < 0.01$), while those earning between \$50,000 and \$74,999 saw a 4.1 percentage point decrease. The effect size continued to increase with income: households earning \$75,000 to \$99,999 reported anxiety at rates 6.3 percentage points lower than the lowest income group, and those in the \$100,000 to \$149,999 range were 8.9 percentage points less likely to report anxiety. At the upper end of the income distribution, the effect was even more pronounced. Households earning between \$150,000 and \$199,999 were 11.5 percentage points less likely to report anxiety, while those earning above \$200,000 experienced a 13.4 percentage point reduction ($p < 0.01$ for all).

Receipt of Supplemental Nutrition Assistance Program (SNAP) benefits was associated with higher anxiety. The coefficient on SNAP receipt (0.057, $p < 0.01$) indicates that households receiving SNAP were 5.7 percentage points more likely to report anxiety than those not receiving benefits. This suggests that individuals receiving SNAP are likely experiencing ongoing financial insecurity, which may make them more prone to reporting anxiety, even with access to government assistance. While SNAP helps

address material needs, it may not be enough to fully ease the emotional stress tied to economic hardship

Health and Disability-Related Factors

Physical-related challenges were also strongly associated with increased anxiety. Individuals who reported difficulty seeing were 13.7 percentage points more likely to report anxiety compared to those without vision impairments ($p < 0.001$). Similarly, those experiencing mobility difficulties were 13.8 percentage points more likely to report anxiety ($p < 0.001$), which may reflect reduced physical independence or added financial stress from healthcare needs. Hearing difficulties were also associated with elevated anxiety, though to a lesser extent, with a 8.4 percentage point increase in the likelihood of reporting anxiety ($p < 0.001$). These findings suggest that disability-related barriers may compound psychological distress, particularly when they intersect with financial vulnerability or limited access to care.

Event-Study Analysis: Weekly Effects of CTC Eligibility on Anxiety

To better understand how anxiety levels evolved around the introduction of the expanded CTC, an event-study regression was estimated using week-by-week interactions between survey wave and CTC eligibility. This allows for a more granular examination of trends, identifying when differences in anxiety emerged between eligible and ineligible households. The results imply that, even before the CTC payments began (Weeks 29 - 33), there were already small but statistically significant differences in anxiety between the two groups. In particular, the interaction terms for Weeks 29 through 32 show positive and statistically significant coefficients, ranging from approximately 0.039 to 0.048 ($p < 0.01$). These findings indicate that eligible households were already

experiencing slightly increased anxiety relative to ineligible households before policy implementation. Therefore, the event-study does not provide clear evidence against the parallel trends assumption. While there are pre-treatment interaction terms that are statistically significant, their magnitudes are modest, and the differences do not appear to systematically widen or narrow over time. Given that the model also includes a binary indicator for CTC eligibility, interpreting these pre-treatment interactions is somewhat ambiguous, as they may capture residual differences unrelated to differential trends. Following the introduction of the expanded CTC in Week 34, the divergence in anxiety between eligible and ineligible households became more distinct. Beginning in Week 34 and continuing through Week 41, the interaction terms for eligibility grow in size and remain statistically significant throughout. In the immediate post-treatment period (Weeks 34 - 35), CTC-eligible households already exhibited significantly higher anxiety, with coefficients of approximately 0.043 and 0.038, respectively ($p < 0.01$). This gap widened further in the mid-to-late post-treatment period (Weeks 36 - 41), with coefficients ranging from 0.054 to 0.072 and all statistically significant at the 1 percent level. The event-study regression results support the baseline DID finding that CTC eligibility was associated with a modest increase in anxiety after the policy was implemented.

The event-study regression estimates reveal that the increase in anxiety among eligible households was not a delayed response but rather emerged quickly and persisted throughout the post-treatment period. While the CTC provided meaningful financial support, these findings suggest it may not have been sufficient to counteract other

stressors, such as economic uncertainty, inflation, or caregiving burdens, that were disproportionately felt by families with children during this time.

Table 3. Primary Regression Results

	(1)		(2)		(3)	
	Traditional DID Model		Traditional-Controls DID Model		Event-Study DID Model	
Treatment Period Indicator						
<i>Post-Treatment (Weeks 34-41)</i>	0.057	***	0.053	***		
	(0.005)		(0.005)			
Eligible for Child Tax Credit						
<i>Yes</i>	-0.033	***	0.008		-0.026	**
	(0.005)		(0.005)		(0.011)	
Treatment Period Indicator # Eligible for Child Tax Credit						
<i>Post-Treatment (Weeks 34-41) # Yes</i>	0.024	***	0.025	***		
	(0.006)		(0.006)			
Household income category (before taxes)						
<i>\$25,000 - \$34,999</i>			-0.013	**	-0.013	**
			(0.007)		(0.007)	
<i>\$35,000 - \$49,999</i>			-0.024	***	-0.024	***
			(0.006)		(0.006)	
<i>\$50,000 - \$74,999</i>			-0.041	***	-0.041	***
			(0.006)		(0.006)	
<i>\$75,000 - \$99,999</i>			-0.063	***	-0.064	***
			(0.006)		(0.006)	
<i>\$100,000 - \$149,999</i>			-0.089	***	-0.089	***
			(0.006)		(0.006)	
<i>\$150,000 - \$199,999</i>			-0.115	***	-0.116	***
			(0.007)		(0.007)	
<i>\$200,000 and above</i>			-0.134	***	-0.134	***
			(0.007)		(0.007)	
Educational attainment						
<i>Some high school</i>			0.036	*	0.034	
			(0.021)		(0.021)	
<i>High school graduate or equivalent</i>			0.048	***	0.047	***
			(0.018)		(0.018)	
<i>Some college, but degree not received or in progress</i>			0.116	***	0.114	***
			(0.018)		(0.018)	
<i>Associate's degree</i>			0.096	***	0.094	***
			(0.018)		(0.018)	

Table 3 (Cont.)

	(1) Traditional DID Model	(2) Traditional-Controls DID Model	(3) Event-Study DID Model
<i>Bachelor's degree</i>		0.132 *** (0.018)	0.130 *** (0.018)
<i>Graduate degree</i>		0.164 *** (0.018)	0.162 *** (0.018)
Marital status			
<i>Widowed</i>		-0.003 (0.014)	-0.003 (0.014)
<i>Divorced</i>		0.024 *** (0.004)	0.024 *** (0.004)
<i>Separated</i>		0.084 *** (0.008)	0.084 *** (0.008)
<i>Never married</i>		0.021 *** (0.004)	0.021 *** (0.004)
Male		-0.101 *** (0.003)	-0.101 *** (0.003)
Total number of people in household		-0.007 *** (0.001)	-0.007 *** (0.001)
White		0.056 *** (0.003)	0.055 *** (0.003)
Hispanic origin		0.006 (0.004)	0.006 (0.004)
Any seeing difficulty (some severity)		0.137 *** (0.003)	0.137 *** (0.003)
Any hearing difficulty (some severity)		0.084 *** (0.004)	0.084 *** (0.004)
Any mobility difficulty (some severity)		0.138 *** (0.004)	0.138 *** (0.004)
SNAP Receipt		0.057 *** (0.005)	0.057 *** (0.005)
Week of interview			
29			-0.056 *** (0.012)
30			-0.065 *** (0.012)
31			-0.073 *** (0.012)
32			-0.077 *** (0.013)
33			-0.067 *** (0.013)
34			-0.029 ** (0.012)
35			0.012

Table 3 (Cont.)

	(1) Traditional DID Model	(2) Traditional-Controls DID Model	(3) Event-Study DID Model
36			(0.012) 0.010
37			(0.012) 0.009
38			(0.012) 0.011
39			(0.013) -0.017
40			(0.013) -0.019
41			(0.012) -0.009
			(0.011)
Week of interview #			
Eligible for Child Tax			
Credit			
29 # Yes			0.048 *** (0.015)
30 # Yes			0.047 *** (0.015)
31 # Yes			0.039 *** (0.015)
32 # Yes			0.047 *** (0.015)
33 # Yes			0.016 (0.016)
34 # Yes			0.043 *** (0.015)
35 # Yes			0.038 *** (0.015)
36 # Yes			0.068 *** (0.015)
37 # Yes			0.072 *** (0.015)
38 # Yes			0.054 *** (0.015)
39 # Yes			0.067 *** (0.016)
40 # Yes			0.060 *** (0.015)
41 # Yes			0.065 *** (0.014)
Intercept	0.609 *** (0.004)	0.466 *** (0.020)	0.525 *** (0.022)
R-squared	0.01	0.08	0.08

Number of observations	119875	119875	119875
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*** p<.01, ** p<.05, * p<.1

Heterogeneity Analysis: DID and Event-Study Results

Examining the overall impact of the CTC on anxiety provides valuable insight, but it is also vital to recognize that households may not experience policy effects uniformly. Households differ in terms of financial resources, caregiving responsibilities, and socioeconomic backgrounds, all of which can shape the extent to which the CTC influences psychological well-being. To better understand who benefits the most, both traditional DID and event-study models were estimated across different subgroups. By disaggregating the analysis, this section highlights variation in the CTC’s impact on single-parent vs. two-parent households, non-college vs. college-educated households, and low-income vs. non-low-income households.

Single-Parent vs. Two-Parent Households

Traditional DID Results

The results in Table 4 show that single-parent households experienced a smaller increase in anxiety following the implementation of the CTC compared to two-parent households, as reflected in the interaction term (-0.031, $p < 0.01$). This suggests that single parents may have benefited more from the CTC, likely because the financial support helped alleviate economic stress. Given that single parents often face higher financial burdens and fewer income-sharing opportunities, the expanded CTC may have provided critical relief, buffering them from some of the anxiety-related pressures seen in two-parent households.

Event-Study Results

A closer examination of the week-by-week anxiety trends provides additional support for the traditional DID findings, offering a more detailed view of how anxiety levels evolved for single-parent and two-parent households. By tracking changes before and after the implementation of the CTC, the event-study analysis helps to confirm whether the observed differences were driven by the policy intervention or part of preexisting trends. If anxiety levels had already been diverging between single-parent and two-parent households before the CTC rollout, it would cast doubt on the causal relationship between the tax credit and mental well-being. However, the findings indicate that both groups followed similar anxiety patterns before the CTC, with meaningful differences emerging only after the policy was introduced.

- Weeks 29-33 (Pre-Treatment): Before the CTC rollout, there were no statistically significant differences in anxiety trends between the two groups, suggesting that they were on relatively similar trajectories before the policy rollout.
- Weeks 34-41 (Post-Treatment): Following the first CTC advanced payments, reported anxiety among two-parent households rose significantly relative to single-parent households. While the week-by-week estimates vary, the interaction coefficients for single-parent households remain consistently negative, with particularly strong effects in Weeks 36 and 37 (e.g., -0.071 , $p < 0.01$). This pattern indicates that single parents experienced a smaller increase in anxiety during the post-treatment period, potentially due to a more immediate or meaningful sense of relief from the financial assistance. This

suggests the CTC may have had a stabilizing effect on single-parent households, helping to mitigate some of the economic stress that might otherwise have led to greater anxiety.

These findings highlight how the influence of financial assistance is not uniform across all family structures. Single parents, who often bear the full weight of financial and caregiving responsibilities, may have been more sensitive to the direct cash infusion, leading to a relatively smaller increase in anxiety compared to their two-parent counterparts.

Table 4. Single-Parent vs. Two-Parent Households Regression Results

	(1)		(2)
	Traditional-Controls DID Model		Event-Study DID Model
Treatment Period Indicator			
<i>Post-Treatment (Weeks 34-41)</i>	0.081 *** (0.004)		
Single-parent household			
<i>Yes</i>	0.001 (0.008)		-0.008 (0.019)
Treatment Period Indicator # Single-parent household			
<i>Post-Treatment (Weeks 34-41) # Yes</i>	-0.031 *** (0.010)		
Household income category (before taxes)			
<i>\$25,000 - \$34,999</i>	-0.009 (0.009)		-0.009 (0.009)
<i>\$35,000 - \$49,999</i>	-0.010 (0.008)		-0.009 (0.008)
<i>\$50,000 - \$74,999</i>	-0.028 *** (0.008)		-0.028 *** (0.008)
<i>\$75,000 - \$99,999</i>	-0.050 *** (0.008)		-0.051 *** (0.008)
<i>\$100,000 - \$149,999</i>	-0.076 *** (0.008)		-0.076 *** (0.008)
<i>\$150,000 - \$199,999</i>	-0.109 *** (0.009)		-0.109 *** (0.009)

Table 4 (Cont.)

	(1)		(2)	
	Traditional-Controls DID Model		Event-Study DID Model	
<i>\$200,000 and above</i>	-0.127	***	-0.127	***
	(0.009)		(0.009)	
Educational attainment				
<i>Some high school</i>	0.043	*	0.042	
	(0.026)		(0.026)	
<i>High school graduate or equivalent</i>	0.055	**	0.053	**
	(0.022)		(0.022)	
<i>Some college, but degree not received or in progress</i>	0.121	***	0.120	***
	(0.022)		(0.022)	
<i>Associate's degree</i>	0.090	***	0.089	***
	(0.022)		(0.022)	
<i>Bachelor's degree</i>	0.128	***	0.127	***
	(0.022)		(0.022)	
<i>Graduate degree</i>	0.167	***	0.166	***
	(0.022)		(0.022)	
Marital status				
<i>Widowed</i>	0.005		0.004	
	(0.018)		(0.018)	
<i>Divorced</i>	0.030	***	0.030	***
	(0.006)		(0.006)	
<i>Separated</i>	0.099	***	0.099	***
	(0.010)		(0.010)	
<i>Never married</i>	0.026	***	0.026	***
	(0.007)		(0.007)	
Male	-0.116	***	-0.115	***
	(0.004)		(0.004)	
Total number of people in household	-0.009	***	-0.009	***
	(0.001)		(0.001)	
White	0.061	***	0.061	***
	(0.004)		(0.004)	
Hispanic origin	0.005		0.005	
	(0.005)		(0.005)	
Any seeing difficulty (some severity)	0.138	***	0.139	***
	(0.004)		(0.004)	
Any hearing difficulty (some severity)	0.082	***	0.082	***
	(0.006)		(0.006)	
Any mobility difficulty (some severity)	0.144	***	0.144	***
	(0.005)		(0.005)	

Table 4 (Cont.)

	(1) Traditional-Controls DID Model	(2) Event-Study DID Model
SNAP Receipt	0.056 *** (0.006)	0.057 *** (0.006)
Week of interview		
29		-0.012 (0.009)
30		-0.017 * (0.009)
31		-0.036 *** (0.010)
32		-0.028 *** (0.010)
33		-0.054 *** (0.010)
34		0.017 * (0.010)
35		0.052 *** (0.009)
36		0.086 *** (0.009)
37		0.086 *** (0.009)
38		0.068 *** (0.010)
39		0.050 *** (0.010)
40		0.036 *** (0.010)
41		0.059 *** (0.009)
Week of interview # Single-parent household		
29 # <i>Yes</i>		0.034 (0.025)
30 # <i>Yes</i>		-0.010 (0.026)
31 # <i>Yes</i>		0.020 (0.027)
32 # <i>Yes</i>		-0.016 (0.027)
33 # <i>Yes</i>		0.026 (0.028)
34 # <i>Yes</i>		-0.030 (0.027)
35 # <i>Yes</i>		-0.017 (0.026)
36 # <i>Yes</i>		-0.071 ***

Table 4 (Cont.)

	(1) Traditional-Controls DID Model	(2) Event-Study DID Model
37 # Yes		(0.026) -0.045 *
38 # Yes		(0.026) -0.024
39 # Yes		(0.027) 0.001
40 # Yes		(0.027) 0.050 *
41 # Yes		(0.026) -0.021
Intercept	0.470 *** (0.025)	(0.025) 0.495 ***
R-squared	0.09	(0.026) 0.09
Number of observations	78795	78795

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

Non-College vs. College-Educated Households

Traditional DID Results

The analysis in Table 5 reveals that non-college-educated households experienced a smaller increase in anxiety following the implementation of the CTC compared to college-educated households, as captured by the interaction term (-0.050, $p < 0.01$). This finding suggests that college-educated households may have faced greater uncertainty or financial planning stress despite receiving the CTC. One possible explanation is that higher-educated households may have had more complex financial obligations, such as mortgage payments, student loans, or childcare costs, which could have heightened financial anxiety even with the additional cash support. Additionally, college-educated households may have been more attuned to broader macroeconomic concerns, such as inflation or the rise in COVID-19 cases, which could have contributed to heightened

stress during this period. In contrast, less-educated households, who may have had fewer financial assets but greater immediate financial needs, might have felt a more tangible benefit from the CTC, helping to mitigate their anxiety levels.

Event-Study Results

A more detailed analysis of anxiety trends over time provides additional clarity on how education level shaped the effects of the CTC. The event-study approach allows us to see whether the divergence in anxiety levels was already emerging before the CTC payments or if the gap widened only after implementation. If anxiety among non-college households had been declining relative to college-educated households even before the CTC, that would suggest the observed effect was not driven by the policy. However, the findings confirm that both groups were on similar anxiety trajectories before the intervention, with meaningful differences appearing only after the CTC was distributed.

- Weeks 29-33 (Pre-Treatment): During the pre-treatment period, both college-educated and non-college households exhibited broadly similar trends in reported anxiety levels. Although non-college households consistently reported slightly lower anxiety, as indicated by the negative (though mostly non-significant) interaction coefficients, these differences were not statistically significant in Weeks 29 through 32. In Week 33, however, there is a modest but statistically significant positive coefficient (0.044, $p < 0.05$), suggesting a brief divergence just prior to the Child Tax Credit rollout. Overall, the absence of significant differences across most of the pre-treatment period supports the parallel trends assumption, indicating that subsequent shifts in anxiety are unlikely to stem from preexisting differences by education level.

- Weeks 34-41 (Post-Treatment): After the CTC advances payments rollout began in Week 34, anxiety rose among both groups, but the increase was significantly smaller for non-college households. The interaction term is negative and statistically significant (-0.050 , $p < 0.01$), and week-by-week estimates show consistent effects from Weeks 35 through 39. For example, the gap narrowed profoundly in Week 38 (-0.058 , $p < 0.01$). This pattern suggests that non-college households may have found the CTC advanced payments providing more financial security, perhaps as they had fewer financial obligations or were more immediately impacted by the relief. In contrast, college-educated households may have faced broader stressors, such as a greater awareness and understanding of the inflationary pressures during mid to late 2021, which may have contributed to a higher likelihood of reported anxiety.

These findings emphasize that education level influences how households perceive and respond to financial assistance. While both groups received the advanced payments, their financial realities and expectations differed, shaping the extent to which the CTC reduced anxiety.

Table 5. Non-College vs. College-Educated Households Regression Results

	(1)	(2)
	Traditional -Controls DID Model	Event-Study DID Model
Treatment Period Indicator		
<i>Post-Treatment (Weeks 34-41)</i>	0.091 *** (0.004)	
Non-College Household		
<i>Non-College Household</i>	-0.138 *** (0.022)	-0.157 *** (0.026)
Treatment Period Indicator # Non-College Household		

Table 5 (Cont.)

	(1)		(2)	
	Traditional -Controls DID Model		Event-Study DID Model	
<i>Post-Treatment (Weeks 34-41) # Non-College Household</i>	-0.050	***		
	(0.007)			
Household income category (before taxes)				
<i>\$25,000 - \$34,999</i>	-0.009		-0.009	
	(0.009)		(0.009)	
<i>\$35,000 - \$49,999</i>	-0.009		-0.009	
	(0.008)		(0.008)	
<i>\$50,000 - \$74,999</i>	-0.027	***	-0.027	***
	(0.008)		(0.008)	
<i>\$75,000 - \$99,999</i>	-0.049	***	-0.049	***
	(0.008)		(0.008)	
<i>\$100,000 - \$149,999</i>	-0.074	***	-0.075	***
	(0.008)		(0.008)	
<i>\$150,000 - \$199,999</i>	-0.107	***	-0.108	***
	(0.009)		(0.009)	
<i>\$200,000 and above</i>	-0.125	***	-0.126	***
	(0.009)		(0.009)	
Educational attainment				
<i>Some high school</i>	0.043	*	0.044	*
	(0.026)		(0.026)	
<i>High school graduate or equivalent</i>	0.055	**	0.055	**
	(0.022)		(0.022)	
<i>Some college, but degree not received or in progress</i>	0.122	***	0.122	***
	(0.022)		(0.022)	
<i>Associate's degree</i>	-0.076	***	-0.076	***
	(0.006)		(0.006)	
<i>Bachelor's degree</i>	-0.039	***	-0.039	***
	(0.004)		(0.004)	
Marital status				
<i>Widowed</i>	-0.001		-0.001	
	(0.018)		(0.018)	
<i>Divorced</i>	0.024	***	0.024	***
	(0.005)		(0.005)	
<i>Separated</i>	0.094	***	0.093	***
	(0.010)		(0.010)	
<i>Never married</i>	0.023	***	0.023	***
	(0.006)		(0.006)	
Male	-0.115	***	-0.115	***
	(0.004)		(0.004)	
Total number of people in household	-0.008	***	-0.008	***

Table 5 (Cont.)

	(1)		(2)	
	Traditional -Controls DID Model		Event-Study DID Model	
	(0.001)		(0.001)	
White	0.061 ***		0.061 ***	
	(0.004)		(0.004)	
Hispanic origin	0.005		0.005	
	(0.005)		(0.005)	
Any seeing difficulty (some severity)	0.138 ***		0.138 ***	
	(0.004)		(0.004)	
Any hearing difficulty (some severity)	0.082 ***		0.082 ***	
	(0.006)		(0.006)	
Any mobility difficulty (some severity)	0.144 ***		0.144 ***	
	(0.005)		(0.005)	
SNAP Receipt	0.056 ***		0.056 ***	
	(0.006)		(0.006)	
Week of interview				
29			-0.013	
			(0.010)	
30			-0.020 *	
			(0.010)	
31			-0.040 ***	
			(0.011)	
32			-0.036 ***	
			(0.011)	
33			-0.063 ***	
			(0.011)	
34			0.011	
			(0.010)	
35			0.059 ***	
			(0.010)	
36			0.086 ***	
			(0.010)	
37			0.092 ***	
			(0.010)	
38			0.080 ***	
			(0.011)	
39			0.060 ***	
			(0.011)	
40			0.044 ***	
			(0.011)	
41			0.069 ***	
			(0.010)	
Week of interview #				
Non-College				
Household				
29 # Non-College				
Household			0.018	

Table 5 (Cont.)

	(1) Traditional -Controls DID Model	(2) Event-Study DID Model
		(0.019)
30 # Non-College Household		0.007 (0.020)
31 # Non-College Household		0.025 (0.020)
32 # Non-College Household		0.019 (0.020)
33 # Non-College Household		0.044 ** (0.020)
34 # Non-College Household		0.011 (0.020)
35 # Non-College Household		-0.035 * (0.020)
36 # Non-College Household		-0.033 * (0.019)
37 # Non-College Household		-0.044 ** (0.020)
38 # Non-College Household		-0.058 *** (0.020)
39 # Non-College Household		-0.039 * (0.021)
40 # Non-College Household		-0.006 (0.020)
41 # Non-College Household		-0.047 ** (0.019)
Intercept	0.623 *** (0.012)	0.652 *** (0.014)
R-squared	0.09	0.09
Number of observations	78795	78795

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

Low-Income vs. Non-Low-Income Households

Traditional DID Results

To ensure a consistent and policy-relevant classification of low-income households, this analysis adopts an income quintile-based approach derived from the U.S. Census Bureau's Historical Income Tables (U.S. Census Bureau, 2024). Specifically, households falling within the first two quintiles ($\leq \$58,020$) were classified as low-income, as these groups represent the lower-income portion of the national distribution. In contrast, non-low-income households were defined as those in the upper three income quintiles, where financial constraints are generally less pronounced. This coding structure ensures that the distinction between low- and high-income groups aligns with national income distribution patterns, offering a standardized framework for assessing the impact of financial interventions across different economic strata.

The analysis in Table 6 shows that low-income households experienced a smaller increase in the likelihood of reporting anxiety after the implementation of the CTC compared to higher-income households, as reflected in the negative interaction term ($-0.049, p < 0.01$). This suggests that low-income households may have benefited more from the CTC, potentially because they were more financially constrained before receiving the payments. The additional income likely provided direct and immediate relief, helping families meet essential needs such as food, rent, and utilities. In contrast, higher-income households may not have felt as strong an impact from the payments, or they may have faced ongoing financial concerns, such as depleted savings or investment losses, that the CTC did not directly address.

Event-Study Results

The week-by-week event-study results provide additional insight into how reported anxiety evolved for low- and high-income households. This approach helps test whether the observed changes were a result of the expanded CTC or the continuation of preexisting trends. If low-income households had already been experiencing a relative decline in anxiety compared to higher-income households before the CTC, then the post-treatment difference would be difficult to attribute to the policy. However, the results show that both groups followed similar trajectories before implementation, with no significant differences in trends during the pre-treatment period. This supports the parallel trends assumption and strengthens the case for a policy-driven explanation.

- Weeks 29-33 (Pre-Treatment): Before the CTC rollout, there were no significant differences in anxiety trends between low- and high-income households, suggesting that both groups were experiencing similar economic and psychological stress levels. This supports the validity of the DID approach by confirming that any post-treatment divergence was unlikely to be due to preexisting differences.
- Weeks 34-41 (Post-Treatment): After the CTC payments began, anxiety rose across both groups, but the increase was less profound among low-income households. This resulted in a narrowing of the anxiety gap between low- and high-income households. The difference became statistically significant beginning in Week 35 and remained so in several subsequent weeks. The strongest effects appeared in Weeks 36 and 37, where the interaction terms reached as much as -0.052 ($p < 0.01$). These findings suggest that the CTC may have acted as a

financial buffer for lower-income families, helping to ease economic pressure and limit further increases in anxiety.

While the CTC was distributed to all eligible families, its impact appears to have been greater for those in lower-income brackets. The relatively smaller increase in the likelihood of reported anxiety among low-income households suggests that direct cash support provided a meaningful form of stress relief, at least in the short term, for those with fewer financial resources.

Table 6. Low-Income vs. Non-Low-Income Households Regression Results

	(1)		(2)	
	Traditional-Controls DID Model		Event-Study DID Model	
Treatment Period Indicator				
<i>Post-Treatment (Weeks 34-41)</i>	0.094 ***			
	(0.004)			
Low-Income Household (\leq \$58,020)				
<i>Yes (\leq \$58,020)</i>	0.154 ***		0.142 ***	
	(0.010)		(0.016)	
Treatment Period Indicator # Low-Income Household (\leq \$58,020)				
<i>Post-Treatment (Weeks 34-41) # Yes (\leq \$58,020)</i>	-0.049 ***			
	(0.007)			
Household income category (before taxes)				
<i>\$25,000 - \$34,999</i>	-0.009		-0.009	
	(0.009)		(0.009)	
<i>\$35,000 - \$49,999</i>	-0.009		-0.009	
	(0.008)		(0.008)	
<i>\$50,000 - \$74,999</i>	-0.028 ***		-0.028 ***	
	(0.008)		(0.008)	
<i>\$75,000 - \$99,999</i>	0.076 ***		0.077 ***	
	(0.006)		(0.006)	
<i>\$100,000 - \$149,999</i>	0.051 ***		0.051 ***	
	(0.006)		(0.006)	
<i>\$150,000 - \$199,999</i>	0.018 ***		0.018 ***	
	(0.006)		(0.006)	

Table 6 (Cont.)

	(1)		(2)	
	Traditional-Controls DID Model		Event-Study DID Model	
Educational attainment				
<i>Some high school</i>	0.044 *		0.043 *	
	(0.026)		(0.026)	
<i>High school graduate or equivalent</i>	0.055 **		0.054 **	
	(0.022)		(0.022)	
<i>Some college, but degree not received or in progress</i>	0.122 ***		0.121 ***	
	(0.022)		(0.022)	
<i>Associate's degree</i>	0.090 ***		0.089 ***	
	(0.022)		(0.022)	
<i>Bachelor's degree</i>	0.128 ***		0.127 ***	
	(0.022)		(0.022)	
<i>Graduate degree</i>	0.167 ***		0.166 ***	
	(0.022)		(0.022)	
Marital status				
<i>Widowed</i>	-0.001		-0.001	
	(0.018)		(0.018)	
<i>Divorced</i>	0.024 ***		0.024 ***	
	(0.005)		(0.005)	
<i>Separated</i>	0.093 ***		0.093 ***	
	(0.010)		(0.010)	
<i>Never married</i>	0.023 ***		0.023 ***	
	(0.006)		(0.006)	
Male	-0.116 ***		-0.115 ***	
	(0.004)		(0.004)	
Total number of people in household	-0.008 ***		-0.008 ***	
	(0.001)		(0.001)	
White	0.061 ***		0.061 ***	
	(0.004)		(0.004)	
Hispanic origin	0.005		0.005	
	(0.005)		(0.005)	
Any seeing difficulty (some severity)	0.138 ***		0.138 ***	
	(0.004)		(0.004)	
Any hearing difficulty (some severity)	0.082 ***		0.082 ***	
	(0.006)		(0.006)	
Any mobility difficulty (some severity)	0.144 ***		0.144 ***	
	(0.005)		(0.005)	
SNAP Receipt	0.056 ***		0.056 ***	
	(0.006)		(0.006)	
Week of interview				
29			-0.015	

Table 6 (Cont.)

	(1) Traditional-Controls DID Model	(2) Event-Study DID Model
30		(0.011) -0.016
31		(0.011) -0.039 ***
32		(0.011) -0.037 ***
33		(0.011) -0.062 ***
34		(0.012) 0.016
35		(0.011) 0.061 ***
36		(0.011) 0.092 ***
37		(0.011) 0.098 ***
38		(0.011) 0.079 ***
39		(0.011) 0.061 ***
40		(0.012) 0.051 ***
41		(0.012) 0.072 ***
		(0.011)
Week of interview #		
Low-Income		
Household ($\leq \\$58,020$)		
29 # Yes ($\leq \$58,020$)		0.021 (0.018)
30 # Yes ($\leq \$58,020$)		-0.006 (0.018)
31 # Yes ($\leq \$58,020$)		0.015 (0.019)
32 # Yes ($\leq \$58,020$)		0.020 (0.019)
33 # Yes ($\leq \$58,020$)		0.029 (0.019)
34 # Yes ($\leq \$58,020$)		-0.006 (0.019)
35 # Yes ($\leq \$58,020$)		-0.035 * (0.018)
36 # Yes ($\leq \$58,020$)		-0.045 ** (0.018)
37 # Yes ($\leq \$58,020$)		-0.052 *** (0.018)
38 # Yes ($\leq \$58,020$)		-0.045 ** (0.019)

Table 6 (Cont.)

	(1)		(2)	
	Traditional-Controls DID Model		Event-Study DID Model	
<i>39 # Yes ($\leq \\$58,020$)</i>			-0.034 *	
			(0.019)	
<i>40 # Yes ($\leq \\$58,020$)</i>			-0.027	
			(0.019)	
<i>41 # Yes ($\leq \\$58,020$)</i>			-0.046 ***	
			(0.017)	
Intercept	0.330 ***		0.358 ***	
	(0.025)		(0.026)	
R-squared	0.09		0.09	
Number of observations	78795		78795	

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

Considerations

The results indicate a statistically significant relationship between CTC eligibility and post-treatment anxiety, with an estimated 2.4 percentage point increase in the likelihood of reporting anxiety among eligible households relative to ineligible households. Although the effect may initially seem modest in absolute terms, it is far from trivial, nearly double the estimated impact of having children. Given the scale of the CTC expansion and its explicit goal of alleviating financial stress, the observed increase in anxiety runs counter to expectations about the program's psychological benefits. However, this increase must be understood within the broader economic and social conditions at the time, including uncertainty surrounding COVID-19 and rising inflation. Inflation surged during the CTC rollout, reaching 5.4% in July 2021 and peaking at 7% year-over-year by December, according to the U.S. Bureau of Labor Statistics. At the same time, consumer sentiment sharply declined: the Michigan Consumer Sentiment Index fell from 88.3 in April to 81.2 in July, the month the first advance payments were dispersed, and continued its descent to 67.4 by year's end. Meanwhile, COVID-19 cases

surged dramatically, with weekly infections rising from approximately 97,000 in early July to over 1.4 million by the last week of December 2021 (WHO, 2023). The DID framework helps account for these shared external shocks by comparing changes in anxiety among CTC-eligible and ineligible households. However, the strength of this identification strategy depends on the validity of the parallel trends assumption. While the event-study analysis suggests broadly similar trends prior to implementation, small but statistically significant pre-treatment differences in some models indicate that the assumption may not hold perfectly. As such, the findings should be interpreted as suggestive rather than definitively causal.

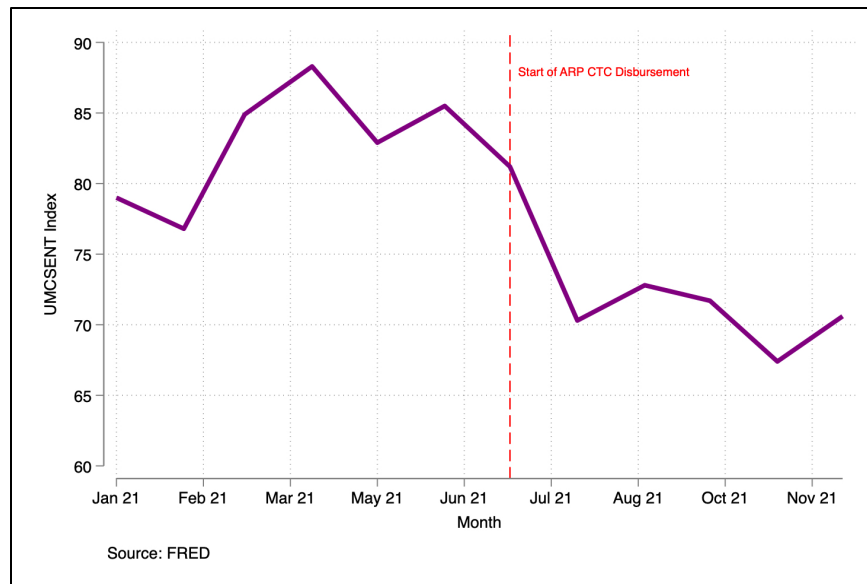


Figure 1. Consumer Sentiment Index, 2021. Source: University of Michigan

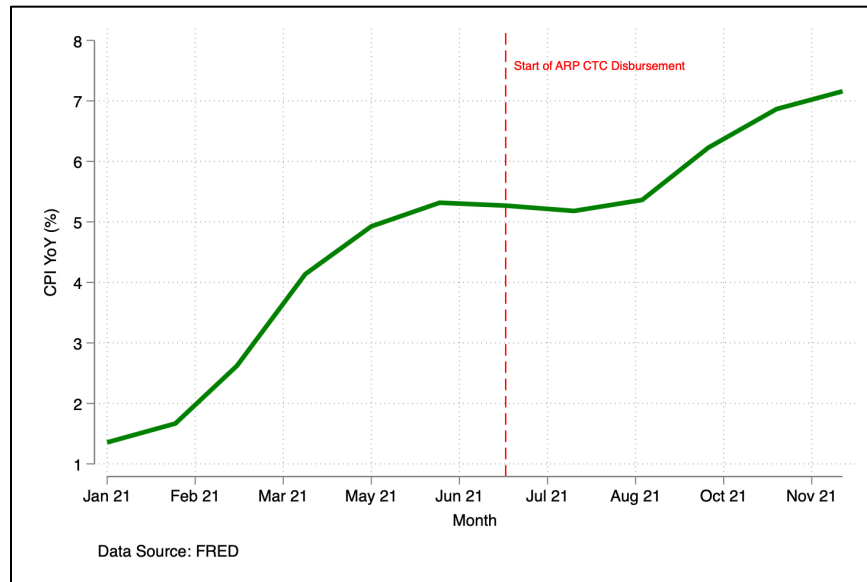


Figure 2. Year-over-Year Change in Consumer Price Index, 2021

The heterogeneity analysis offers insight into who may have been most buffered from increased anxiety. Single-parent households saw a more muted rise in anxiety compared to two-parent households. This suggests that single parents, who often face heightened financial and caregiving burdens, may have been particularly responsive to even modest financial relief. As Melissa Kearney notes, single parents tend to experience more stress due to limited cognitive bandwidth and fewer support systems (Pethokoukis et al., 2023). The CTC may have provided them with immediate financial relief, leading to a relatively smaller increase in anxiety than in two-parent households, where financial and caregiving responsibilities are more widely distributed.

Differences in anxiety responses were also observed across educational backgrounds. Non-college-educated households saw a smaller increase in the likelihood of reported anxiety compared to their college-educated counterparts. This may reflect differences in how these groups responded to the policy: non-college-educated households may have viewed the CTC as a vital source of support for covering

immediate expenses, such as food, rent, or utility bills, leading to short-term relief from financial stress. College-educated households, by contrast, may have been more affected by broader concerns such as inflation, heightened awareness of rising COVID-19 cases, or uncertainty around investments, and may not have experienced the payments as substantially reducing their sources of anxiety. A similar pattern emerges when comparing low- and high-income households. This suggests that for lower-income households, who likely faced greater day-to-day financial instability, the CTC may have provided immediate relief, insulating them from some of the stressors experienced by higher-income households.

Taken together, the findings suggest that the CTC provided the most significant psychological relief to the most economically vulnerable groups, particularly single parents, non-college-educated households, and low-income families. These groups saw a smaller increase in the likelihood of reported anxiety following the policy's implementation, suggesting that the financial support helped buffer against financial stress. For single parents, who often juggle caregiving and financial responsibilities alone, the CTC may have alleviated some of the strain, preventing anxiety from rising as sharply as it did among two-parent households. Likewise, non-college-educated and low-income households, who tend to have less financial security and fewer savings, may have relied more heavily on the credit to cover essential expenses. Survey data confirm this pattern: a majority of lower-income families reported using the CTC to pay for necessities like housing, food, and utilities (Hamilton et al., 2022). These findings underscore how the CTC's impact was not uniform, instead delivering the greatest benefits to those most in need.

DISCUSSION

Summary of Findings

This analysis explores the effect of the expanded CTC on household anxiety levels using a Difference-in-Differences (DID) approach. The analysis estimates the Intent-to-Treat (ITT) effect by defining treatment as CTC eligibility, based on whether a respondent reports having at least one child under the age of 18 in their household. Contrary to expectations, the findings indicate that rather than alleviating financial stress, anxiety among CTC-eligible households slightly increased following the policy's rollout. While the magnitude of this increase is relatively modest, the statistical significance suggests that the expanded CTC did not provide an immediate, large-scale reduction in self-reported anxiety.

These findings challenge the assumption that broad-based cash assistance programs automatically translate into psychological relief. While the CTC was intended to alleviate financial hardship, the persistence of anxiety among recipients suggests that cash assistance alone may not be sufficient to mitigate stress, particularly amid exogenous factors such as macroeconomic volatility and public health crises. However, subgroup analyses reveal a more nuanced story: single-parent, low-income, and non-college-educated households experienced a smaller likelihood of reporting anxiety, indicating that the psychological impact of financial assistance may vary substantially depending on a household's baseline economic vulnerability.

Comparison with Existing Literature

The findings of this analysis both align with and diverge from previous research on the relationship between refundable tax credits, government cash assistance, and

psychological well-being. Existing research indicates that refundable tax credits and unconditional cash transfers (UCT) generally improve mental health outcomes, particularly among low-income households. For example, evidence suggests that increases in income from the EITC led to reductions in reported bad mental health days among low-income mothers, along with improvements in self-reported health (Evans and Garthwaite, 2014). Similarly, research on UCT finds that such programs can lead to improved mental health outcomes, including reductions in stress, anxiety, and hospitalizations for mental health-related conditions (Marinescu, 2018).

Unlike the EITC or UCT programs, the expanded CTC was rolled out during a period of economic tension and pessimism by consumers, which may have offset its incidental mental health benefits. These results also raise critical questions about the distinction between financial relief and perceived financial security. While the CTC temporarily increased household income, it may not have provided the long-term stability necessary to reduce stress. This is consistent with research that suggests that large but temporary cash transfers can improve short-term financial well-being but do not lead to lasting improvements in financial outcomes, particularly for young, low-income households (Bartik et al., 2024).

Limitations and Future Research Directions

While this analysis offers valuable insights, several limitations should be acknowledged. First, the Household Pulse Survey measures self-reported anxiety, which is inherently subjective. Although self-reported mental health indicators are widely used, they may be influenced by factors beyond financial conditions, such as individual personality traits. Additionally, the survey methodology raises concerns about self-report

bias, which the American Psychological Association describes as a methodological issue that arises when researchers rely on individuals to describe their thoughts, feelings, or behaviors rather than measuring these directly and objectively (American Psychological Association, 2018). Furthermore, recall bias may also be a factor, as individuals reporting on the frequency of anxiety over the previous two weeks may unintentionally overestimate or underestimate their experiences, affecting the accuracy of self-reported responses (American Psychological Association, 2018). This type of distortion can have significant implications, potentially affecting the accuracy of retrospective self-assessments.

Second, this analysis examines CTC eligibility rather than the actual receipt of payments. While eligibility serves as a reasonable proxy, it does not account for non-compliance, or discrepancies between those eligible for the CTC and those who received it. As previously discussed, the high rate of slippage is particularly noteworthy, with approximately 36.92% of eligible households reporting non-receipt. This gap persists despite the IRS automatically enrolling eligible households for advance CTC payments if they had filed a 2019 or 2020 tax return or used the IRS Non-Filer Tool (IRS, 2021). However, households that did not file taxes or register through these tools were not automatically enrolled and had to claim the credit when filing their 2021 tax return. This raises concerns that some households were either unaware of the program or uncertain about their eligibility, potentially limiting the intended reach and impact of the policy. Lastly, this analysis is limited to short-term effects. The Household Pulse Survey captures only the immediate aftermath of the CTC expansion, leaving long-term psychological

outcomes unknown. However, with additional data, future research can further explore these longer-term effects.

Policy Implications

The findings of this analysis hold several significant implications for policy design and delivery. First, while direct cash assistance programs like the expanded CTC in 2021 can provide critical financial relief, their psychological effectiveness may be constrained during periods of economic volatility and societal challenges. Unlike programs such as the EITC, which function with or without more stable economic conditions, the CTC was implemented amid heightened uncertainty, such as rising inflation and a public health crisis. These external pressures may have limited its immediate impact on household well-being. However, such periods are also when families are most in need of support, underscoring the importance of designing assistance programs that are responsive to both the financial and emotional dimensions of economic insecurity. While direct payments can ease material hardship, their impact on psychological well-being may be dampened when households face broader and more unpredictable stressors.

Second, the evidence suggests that targeting support toward the most vulnerable groups could improve policy effectiveness. This analysis found that single-parent households, non-college-educated individuals, and low-income families experienced smaller increases in the likelihood of reported anxiety than their counterparts, suggesting that these groups may have benefited more from the advance payment CTC policy. Policymakers should consider structuring benefits to deliver larger or more frequent

payments to such households, as they appear to be more responsive to financial assistance and more susceptible to financial strain.

Finally, these findings highlight the need for broader policies to complement cash assistance. While the CTC provided a temporary income boost, the increase in anxiety among eligible households suggests that direct payments alone may not be sufficient to alleviate financial stress. To maximize their effectiveness, cash transfer programs should be embedded within a broader support framework that addresses cost-of-living pressures, such as affordable childcare, housing support, and employment stability measures, so that families not only receive financial relief but also experience a greater sense of economic security and psychological well-being.

Conclusion

This analysis contributes to the growing body of research on refundable tax credits, cash assistance programs, and household well-being, offering evidence of the effects of the expanded CTC during a period of economic pessimism and uncertainty. While the program provided financial support, its impact on self-reported anxiety was more complex than anticipated, with evidence suggesting that external economic conditions and household characteristics shaped psychological outcomes. These findings highlight the significance of policy design in determining the effectiveness of refundable tax credits and cash assistance programs. Future research should continue to explore how economic and psychological security interact, particularly in the context of large-scale social policy interventions.

APPENDIX: ADDITIONAL FIGURES

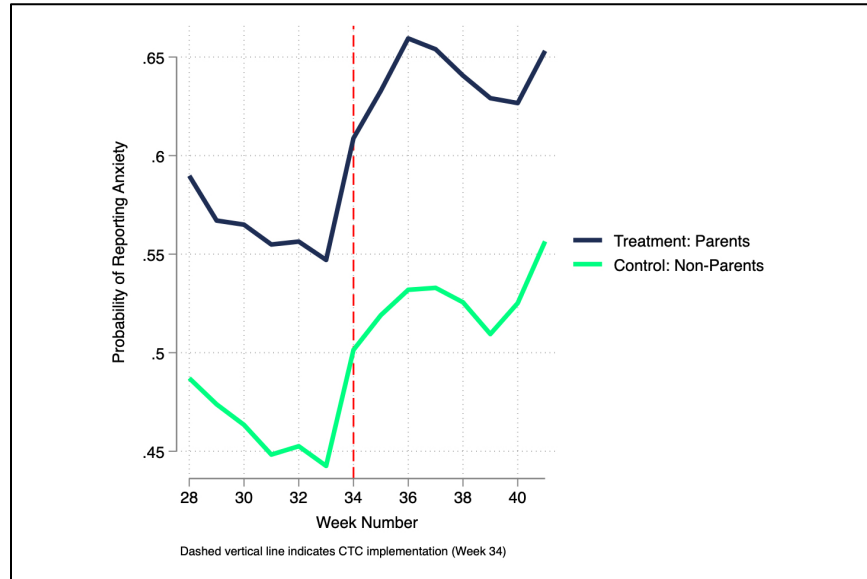


Figure 3. Parallel Trends - Parents and Non-Parents (All)

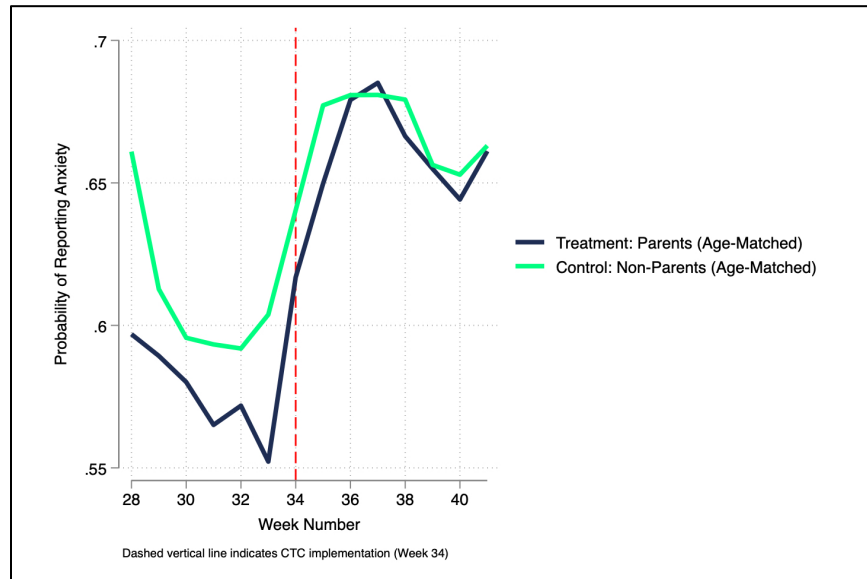


Figure 4. Parallel Trends - Parents and Non-Parents (Age-Matched)

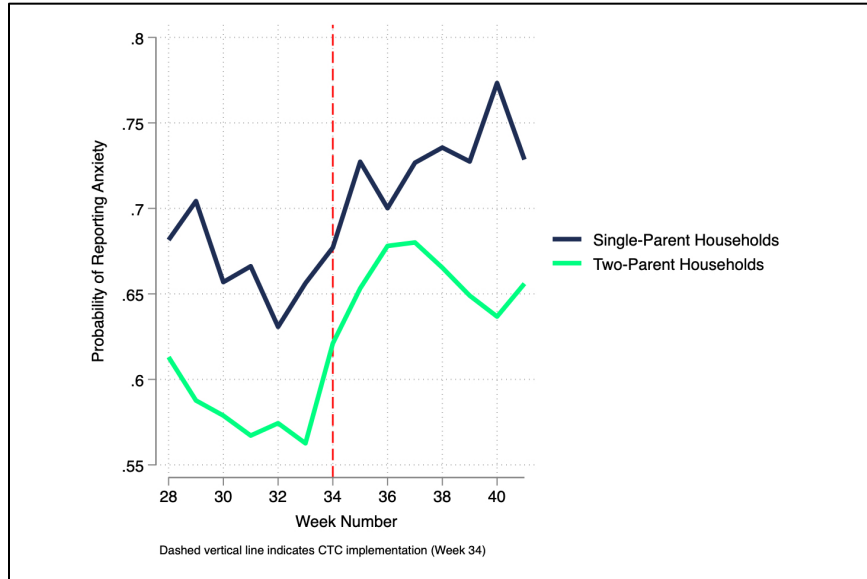


Figure 5. Parallel Trends - Single and Two-Parent Households (Age-Matched)

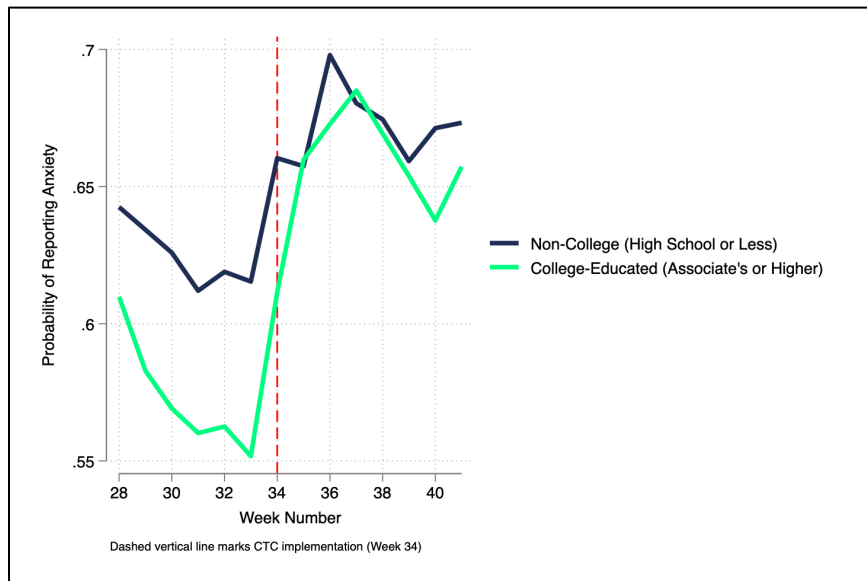


Figure 6. Parallel Trends - Non-College and College Households (Age-Matched)

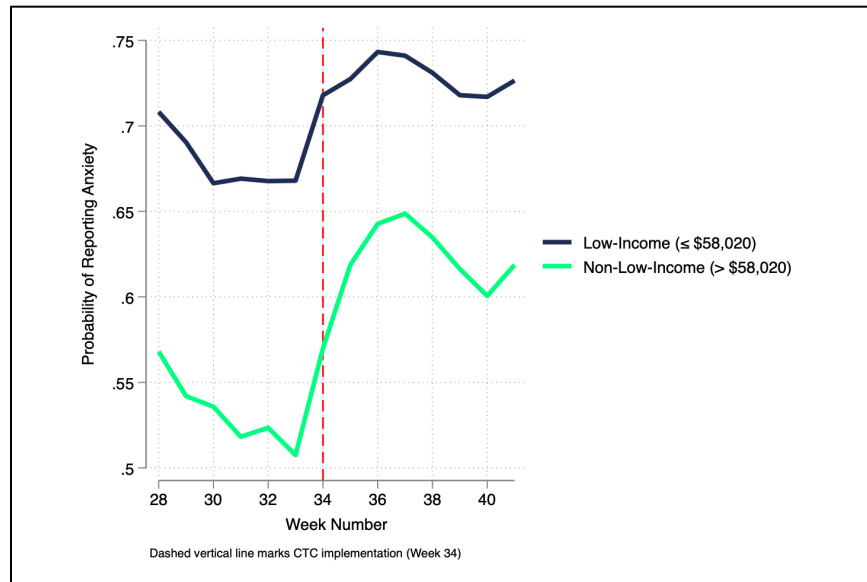


Figure 7. Parallel Trends - Low-Income and Non-Low-Income Households (Age-Matched)

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