



Supplemental nutrition assistance program and parents' time investments in children

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ABSTRACT

An emerging literature explores whether social policy programs have benefits to families and their children, above and beyond economic and human capital outcomes. We investigate whether the Supplemental Nutrition Assistance Program (SNAP), an anti-poverty program, is associated with the time that parents invest in their children. We assess the association between SNAP and parental time investments by leveraging the temporary expansion of SNAP benefits provided through the American Recovery and Reinvestment Act (ARRA) of 2009. Applying a difference-in-difference with Coarsened Exact Matching approach to data from the American Time Use Survey, we investigate whether increased SNAP benefit levels were associated with parental time investments in basic care, management, play, and teaching activities. We find that ARRA-induced increases in SNAP benefit levels were associated with a decreased probability of time spent on management activities and an increased probability of time spent on basic care among single parents. This suggests that SNAP benefit increases influence how parents allocate time to their children.

1. Introduction

The investments that parents make in their children play a crucial role in development and later life attainment (Heckman & Mosso, 2014; Kalil, 2014; McLanahan, 2004). For children ages 12 and under, parental time is the most common investment that parents make in their children (Caucutt, Lochner, Mullins, & Park, 2020) and is especially important for children's educational outcomes (Carneiro & Rodrigues, 2009; Del Boca, Flinn, & Wiswall, 2014). A growing concern is the class divide in parental time investments whereby parents with more income and education invest more time in their children or invest time in activities more likely to foster positive educational outcomes than economically disadvantaged parents (Guryan et al., 2008; Schneider et al., 2018). This backdrop of stark class differences in parenting time raises concerns about potential consequences for education inequality among children in the short-term, as well as widening inequality in adulthood (Huggett et al., 2011).

A nascent body of literature examines to what extent parental time investments react to an influx of resources from anti-poverty programs. Anti-poverty programs may allow parents to purchase goods or services and free up time that parents reallocate to parenting activities. Equally,

receipt of social benefits may reduce financial stress allowing parents to carry out their best parenting intentions. Broadly, studies investigating the outcome of anti-poverty programs have focused predominantly on economic measures (e.g., income, expenditures, and labor supply) and human capital outcomes (e.g., education and health). However, the relatively recent availability of detailed, longitudinal data on how individuals spend their time has paved the way for studies on time use as an outcome. Evidence emerging from this new body of research suggests that such programs do appear to be associated with both positive and negative changes in time use, including time spent on parenting activities (Bastian & Lochner, 2020; Beatty et al., 2014; Kim et al., 2019; Morrissey, 2022; You & Davis, 2019).

In our study, we investigate whether Supplemental Nutrition Assistance Program (SNAP) is associated with the time that parents invest in their children in the United States (US). SNAP is one of the largest and most effective anti-poverty programs aimed at families with children in the US (Harper et al., 2022). Reaching approximately 8.1 million households with children (Fiscal Year 2018), SNAP is a near-cash, in-kind benefit that provides a monetary value via electronic benefit cards that can only be spent on qualified food items (U.S. Department of Agriculture, 2016). Nearly one-half of all US children will receive SNAP

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at some point over their childhood (Rank & Hirschl, 2009). SNAP benefits have been shown to have positive associations with a wide range of outcomes relevant to children's health and wellbeing, including nutrition and physical health (Almond, Hoynes, & Schanzenbach, 2011; Gibson-Davis & Foster, 2006; Lee & Mackey-Bilaver, 2007; Morrissey & Miller, 2020), family economic wellbeing (Hoynes & Schanzenbach, 2009), school readiness (Hong & Henly, 2020), academic outcomes (Frongillo, Jyoti, & Jones, 2006; Gassman-Pines & Bellows, 2018), and behavior problems (Gennetian et al., 2016).

Yet, despite the large public investments in the SNAP program and significant interest in supporting the academic achievement of low-income children, we know very little about what mechanisms might explain the relationship SNAP has with children's academic outcomes. One possible mechanism is that SNAP has spillover effects on the time that parents invest in their children. Indirectly, SNAP participation may reduce parenting stress, which could have downstream effects on parental time investments (Wang et al., 2021). More directly, initial evidence suggests that SNAP benefits do influence household time use on food shopping and meal preparation (Beatty et al., 2014; Kim et al., 2019; You & Davis, 2019) and it is feasible that such time effects could spill over to parenting time. To explore this potential link between SNAP and parental time investments, we use American Time Use Survey (ATUS) data to investigate whether an expansion in SNAP benefit levels was associated with parental time investments and whether the relationship between SNAP benefit levels and parental time investments varies by activity — provision of basic care, teaching, play, and management. We also explore whether there are observed differences in the relationship between SNAP benefit levels and parental time investments by family structure. To answer these research questions, we exploit the temporary expansion of SNAP benefits related to the American Recovery and Reinvestment Act (ARRA) and compare changes in parental time investments between parents in SNAP-participant households and a matched group of parents in eligible, but non-participating households during the ARRA expansion period.

2. Background

2.1. Parental time investments and Children's development

Parental time investments are one of the most important factors influencing children's development and academic achievement before they are 12 years old (Caucutt et al., 2020). For example, parental time, including time related to children's education and health and attending cultural activities, was associated with higher reading and math test scores (Del Boca, Monfardini, & Nicoletti, 2012). Certain types of parental time investments appear to be particularly 'productive' for children's cognitive outcomes, namely educational activities, such as reading a story, being talked to, or helping with chores (Fiorini & Keane, 2014). One study estimates that a one standard deviation increase in the number of days mothers spend reading to children increases children's reading achievement by about 80 % of a standard deviation (Price & Kalil, 2019). The associations between parental time investments and children's behavior has received comparatively less attention and the evidence is mixed.

Parental time investments vary by family structure. Time is a more limited resource in single-parent families and children living with single mothers receive fewer parental time investments than those in married parent families (Kalil et al., 2014). The distribution of parental time investments are also likely to vary by child age because children's needs differ substantially across different developmental stages (Kalil et al., 2012). Perhaps because of young children's greater needs for parents' time, parents' time investments have a greater influence on child outcomes at earlier ages (Bono et al., 2016; Carneiro & Rodrigues, 2009; Hsin & Felfe, 2014). For example, during toddlerhood and the preschool period, children require parental investments in basic physical caregiving, play, reading and other didactic activities with a parent for

optimal child development. In contrast, parents spend less time interacting directly with children during middle childhood and more time planning and monitoring their academic and social networks (Bornstein 2002).

2.2. Income and parental time investments

Given the salience of parental time investments to children's development, it is concerning that significant socioeconomic disparities in parental time investments can be observed. Most studies considered disparities by parental education and found that mothers with higher levels of education are more likely to focus their time with children on activities that improve their children's social and cognitive skills (Altintas, 2016; Ramey & Ramey, 2010). However, recent evidence suggests that the education-related time gap is narrowing as mothers with the lowest levels of education increase their time in active childcare time (Prickett & Augustine, 2021).

To our knowledge, no studies have looked specifically at income-based disparities in the amount of time parents invest in their children, but there is substantial evidence that the type of activities that parents engage in with their children varies by income. In fact, a study using harmonized datasets shows widening income gaps in reading and telling stories to children and teaching children letters, words, and numbers, as well as activities such as attending a concert or museum or going to the zoo (Kalil et al., 2016). Largely, these gaps are due to top-income families pulling away from middle- and low-income families. However, decreasing income inequalities were observed in learning activities at home (Bassok, Finch, Lee, Reardon, & Waldfogel, 2016).

Emerging research on the effects of an influx of income on parental time investments through the Earned Income Tax Credit (EITC) is also informative for understanding the link between income and parents' time investments. In their analysis of the EITC using data from the ATUS, Bastian and Lochner (2020) found that, among unmarried mothers only, increased EITC benefit levels were associated with increased labor force participation and work hours and reduced time providing or obtaining medical care for children. However, they found no associations with teaching activities, such as reading and helping with homework. The authors found that these effects were strongest among young children and on weekdays (Bastian & Lochner, 2020). The lack of substantial changes in parental time investments was corroborated by evidence examining effects of EITC refunds on parent-child engagement time. Morrissey found that EITC outlays predicted increases in the time spent reading to or with young children (under age 6) for all mothers and married mothers lacking a college degree, but less time attending events with their young children among less-educated mothers (Morrissey, 2022). Together, these findings suggest that cash benefits, may have small effects on overall time spent with children, that potential effects differ by the types of parenting activities, and that effects may be concentrated among single-parent households and parents of young children.

2.3. The case for a relationship between SNAP and parental time investments

Since evidence suggests that increases in financial resources could influence the time that parents invest in their children, it is feasible that near-cash, in-kind SNAP benefits could do the same. In fact, the EITC, though cash, is only a once annual refund and its influence on parenting time may be limited relative to SNAP, which is received monthly and therefore has the potential to influence parenting time in more meaningful ways. To our knowledge, no studies have yet examined the relationship between SNAP benefits and parental time investments. We suggest that there are four explanations for why increased SNAP benefits may influence parental time investments, but the direction of that influence is ambiguous.

First, an increase in SNAP benefits may reduce the number of hours

parents work, leaving more time available to invest in their children. Kim and colleagues found that higher SNAP benefit amounts were linked to less time working (Kim et al., 2019). This may be especially true in single-parent households. Hoynes and Schanzenbach, found that women in single-parent households reduce their working hours in response to receiving SNAP benefits (2012).

Second, an increase in SNAP benefits may free up other financial resources to be invested in meeting other essential needs through goods or services that, in turn, could free up time that parents can reallocate to interacting with their children. There is evidence that SNAP benefits are associated with increases in housing, transportation, and education expenditures (Kim, 2016; Kim et al., 2019). For example, a parent may be able to save commuting time by purchasing a used car with the resources freed up by increased SNAP benefits and, in turn, invest that additional time in their children. It is also possible that parents may use the resources freed up by an increase in SNAP benefits to invest in additional hours of formal or informal non-parental childcare and consequently reduce the developmental time parents spend with their children. At a minimum, a reduction in time spent on the basic care of children would likely be reduced as a result of additional hours of non-parental childcare.

Third, the additional resources introduced by an increase in SNAP benefits resources may impact the quality of parent-child interactions and the time that children spend with their parents by reducing the stress a family experiences according to the Family Stress Model (FSM) (Conger & Donnellan, 2007). Specifically, the FSM posits that financial strain undermines parents' socioemotional resources and disrupts parent-child interactions through increased parental depression and anxiety, which decreases the quality of parent-child interactions (Goodman et al., 2011; Wachs, Black, & Engle, 2009). Evidence shows that SNAP benefits are associated with reduced parenting stress (Wang et al., 2021), which could increase the amount or the quality of time parents spend with their children. Relatedly, SNAP is associated with reduced food insecurity (Gregory & Todd, 2021; Mabli et al., 2013), which is, in turn, associated with parental stress and less engaged or positive parenting (Bronte-Tinkew et al., 2007; Gee & Asim, 2019; Slack & Yoo, 2005). Furthermore, SNAP households employ dynamic coping strategies to manage food and financial insecurity (Schenck-Fontaine et al., 2017), all of which require potential time away from interactive parenting time. For example, SNAP recipients report traveling farther distances to find acceptable food resources as well as making multiple shopping trips and adjusting food consumption to remain within budget during the SNAP benefit cycle (Kinsey et al., 2019). The constant rationing of benefits and identifying additional resources to avoid food insufficiency common at the end of a SNAP benefit month (Schenck-Fontaine et al., 2017) is mentally effortful and SNAP recipients report extra cognitive load for planning meals to balance family's food preferences against household budget constraints (Kinsey et al., 2019). Thus, it is feasible that an increase in SNAP benefits could reduce parents' stress and cognitive burden by reducing food insecurity and improving economic well-being and thus increase their ability and availability to positively engage with their children.

Fourth, it is possible that SNAP policy design features that are linked to increases in meal preparation time for some families (Beatty et al., 2014) could crowd out time parents would otherwise spend with their children. SNAP participation and benefit levels are associated with changes in the amount of time spent on meal preparation and related tasks (Beatty et al., 2014; Davis & You, 2010; Kim et al., 2019; You & Davis, 2019). Single-parent households experience an increase in meal preparation time, whereas meal preparation time decreases as a function of SNAP participation and benefit levels for married and cohabiting households (Beatty et al., 2014; You & Davis, 2019). That greater SNAP benefit amounts are associated with relatively more time spent on meal preparation at least for single-parent households could be because SNAP benefit amounts are calculated based on the Thrifty Food Plan, which assumes a relatively large time investment in meal preparation (Davis &

You, 2010). One study suggests that a \$30 increase in SNAP benefits was associated with a 2.6 % increase in time spent on food preparation and a 3.4 % increase in food shopping (Anderson & Butcher, 2016). This increase in the amount of time single parents spend on preparing meals could lead to an offset in the time parents are able to spend with their children. Indeed, Wang et al. (2021) found that SNAP participation is linked to reduced levels of parents' engagement in developmentally enriching activities for their children and the authors hypothesize that this is due to SNAP design elements associated with increased food preparation requirements.

2.4. Current study

The current study focuses on two research questions. One, is an increase in SNAP benefit amounts associated with parents' time spent engaging in parenting activities for children ages zero to 12? Two, is there a difference in the association between increased SNAP benefits and parenting time between single-parent households and cohabiting or married households? Based on the existing evidence, we hypothesize that an increase in SNAP benefit amounts is associated with a change in parents' time spent with their children, but the direction of that relationship is ambiguous. On one hand, as SNAP benefit amounts increase, overall parenting time with children among families who receive SNAP benefits may also increase because of increased financial resources and reduced stress. On the other hand, an increase in SNAP benefits may be associated with overall less time available for parenting activities, because SNAP design elements increase the amount of time needed for meal preparation. However, given that single-parent households are more likely to reduce their work hours and also report greater increases in meal preparation time, we hypothesize that the association between a SNAP benefit increase and parenting time is largest among single-parent households. To answer these research questions, we leverage the exogenous expansion of SNAP benefit amounts by the American Recovery and Reinvestment Act (ARRA) of 2009.

3. Data and methods

3.1. Data

We used data from the American Time Use Survey (ATUS) collected from 2003 to 2010 to examine whether SNAP benefits were associated with changes in parents' time with their children. The ATUS, made available by IPUMS, is an annual repeated cross-sectional survey conducted by the Census Bureau that collects time diary information to measure the time people spend on various daily activities in the US. Respondents are asked to report the number of minutes they spend on a variety of activities in a 24-hour period, ranging from volunteering to childcare to employment, which are then coded into activity categories. This time diary approach is useful for studying parental investments as it provides accurate estimates of time use while minimizing recall or social desirability biases (Atlintas, 2016; Bianchi, 2011). The sample of ATUS respondents is drawn from households that have completed their final Current Population Survey (CPS) interviews in a given year and is nationally representative of U.S. residents aged 15 or older. We restricted our analytic sample to parents of young and school-aged children (aged 0–12). We also restricted the sample to households at or below 250 percent of the federal poverty line. Our sample of parents includes 10,949 observations across all years, of which 5,414 parents were eligible for SNAP benefits at the time of their ATUS interview.

3.2. Parental time investments

The amount of interactive time spent in activities with children in the household is measured continuously in minutes using 15 ATUS activity codes. We summed across these 15 activity codes to create measures of four categories of parents' time investments based on prior work that

has mapped parent–child interactive activities to developmental needs across different ages (Kalil et al., 2012; 2016) (see Appendix Table A1). The first two categories of activities, basic care and management of children, reflect activities that directly contribute to the well-being of children. The latter two categories, teaching and play activities, more directly contribute to children's development. The relevance of these activities to children's developmental outcomes varies by children's developmental stage. For young children, basic care and play are most important, whereas teaching and management activities become more relevant when children enter school-age (Kalil et al., 2012). We also created dichotomous variables to indicate whether parents participated in the four parenting time activities. In our analyses, we examined both effects at the extensive margin, considering whether parents engaged in that activity, and at the intensive margin, considering how many minutes parents spent in these parenting activities conditional on any time spent.

Basic care of children was calculated as the sum of minutes spent in (1) physical care for household children, (2) looking after household children as primary activity, and (3) caring for and helping household children. This includes activities like bathing, feeding, and monitoring children. *Management of children* was calculated as the sum of minutes spent in (1) organization and planning for household children, (2) attending household children's events, (3) waiting for or with household children, (4) picking up or dropping off household children, and (5) activities related to household children's health. This includes planning activities for children, waiting for the school bus with the children, and talking with a doctor about a sick child. *Playing with children* was measured as the sum of minutes spent in (1) playing with household children, not sports, (2) arts and crafts with household children, and (3) playing sports with household children. This includes singing or dancing with the child and teaching the child to ride a bike. *Teaching children* was calculated as the sum of minutes spent in (1) reading to or with household children, (2) talking with or listening to household children, (3) helping or teaching household children, not related to education, and (4) activities related to household children's education. This includes helping a child read, quizzing a child before a test, and talking to a child's teacher.

3.3. SNAP participation and non-participation among eligible households

For our analyses, we use self-reported SNAP participation in the 12 months prior to the interview. To identify non-participation among eligible households we approximated eligibility for SNAP benefits by calculating whether a household's annual gross income falls at or below 130 percent of the federal poverty line in the year of the ATUS interview, a key eligibility criterion for SNAP. To do this, we used data on gross annual household income collected in the final interview of the respondent's CPS participation, several months before the ATUS interview. Income was measured in 16 categorical bands ranging from "less than \$5,000" to "\$150,000 and over" and we constructed a quasi-continuous measure by taking the mid-point of each income band. Using annual information drawn from the U.S. Department of Health and Human Services on the federal poverty guidelines by household size, we then calculated whether a household's quasi-continuous income fell at or below 130 percent of the federal poverty line for the interview year and for the given household size.

3.4. Exposure to ARRA stimulus

There are well known concerns about the endogeneity of SNAP participation. For example, SNAP recipients are more likely to be food insecure and in poor health relative to eligible nonparticipants (Gundersen et al., 2017). In addition, self-report measurement error plague analyses of the effects of SNAP benefits (Kreider, Pepper, Gundersen, & Jolliffe, 2012; Shaefer & Gutierrez, 2013), in addition to other unobservable characteristics which may bias the association with SNAP

receipt and parental time investments. To address these endogeneity concerns, we leverage an exogenous SNAP benefit increase introduced by the American Recovery and Reinvestment Act (ARRA) of 2009. The ARRA temporarily expanded SNAP benefits from April 2009 to October 31, 2013 by increasing SNAP benefits by 13.6 % of the maximum benefit for each household size. As such, a household of four people received a maximum monthly SNAP benefit in April 2009 of \$668, or an \$80 increase over the \$558 they received in March 2009 (Nord & Prell, 2011). Increased SNAP benefits were consistent across states, and benefits returned to pre-ARRA levels (adjusted for inflation) in November 2013.

A respondent's exposure to the ARRA-induced SNAP benefit level increase was determined by the date of the ATUS interview. To operationalize this, we created a binary variable to indicate whether the ATUS interview date occurred before March 31, 2009, or on April 1, 2009 or later, when the ARRA benefit expansion went into effect. Even though the ARRA-induced expansion in SNAP benefits ended on October 31, 2013, we restricted our focus on the period immediately following the ARRA expansion (i.e., ending in December 2009), because we expected that the impacts of the expansion on parents' time use to be most significant in the short-term when the value of the SNAP benefit was greatest. Due to inflation, the real value of SNAP benefits declined in the years following the expansion. This restriction to 2009 is consistent with other studies that leveraged the ARRA expansion as a natural experiment (e.g., Morrissey & Miller, 2020; Nord & Prell, 2009).

3.5. Covariates

All models are adjusted for a number of socio-demographic characteristics that are correlates of SNAP participation and parental time investments (Kalil et al., 2012). In particular, we included controls for parents' age, number of children in the household, number of adults in the household, parent's gender, whether there was a spouse or unmarried partner in the household, and parent's race/ethnicity. We also included controls for the age of the youngest child in the household and whether the time diary was conducted on a weekday versus a weekend. Last, we included state fixed effects to control for stable, unobserved state differences correlated with parental time investments and SNAP participation. We also included year fixed effects to account for changes in a given year that could influence both parental time investments and SNAP participation across all states (e.g. economic downturn periods).

3.6. Data preparation and analytic approach

Concerns about the endogeneity of SNAP participation because of selection into SNAP plague analyses of the effects of SNAP benefits (Kreider, Pepper, Gundersen, & Jolliffe, 2012; Shaefer & Gutierrez, 2013), in addition to other unobservable characteristics associated with SNAP receipt and parental time investments. To partially address this endogeneity problem, we use the Coarsened Exact Matching technique, a technique also employed in two related studies examining the relationship between SNAP participation and food-related time use (Beatty et al., 2014) and the relationship between the sunset of the ARRA-induced SNAP benefit increase on household time use patterns (Kim et al., 2019). Coarsened Exact Matching (CEM) is an exact matching method to create balanced groups for comparison based on a set of broader, or coarsened, categories (Blackwell et al., 2009). To match eligible non-participants to the treatment group of SNAP participants, we coarsen several variables, including number of children and adults in the household, the presence of children under age six, and respondents' demographic characteristics. Following Beatty et al.'s approach (2014), we then exclude 243 unmatched observations, of which 59 are in the treatment group (i.e., SNAP participants) and 184 are in the control group (i.e., eligible non-participants).

Using this matched set of observations, we then leverage a quasi-random increase in SNAP benefits that was introduced by ARRA to further address concerns about endogeneity and reverse causality. Both

treatment and control groups have low household income, but they differ in their receipt of SNAP benefits. The key underlying assumption is that the ARRA-induced SNAP benefit increase should be associated with the time that parents in SNAP-participating households spent with their children, but not the parental time investments of eligible households who did not receive SNAP benefits and, therefore, were not affected by this benefit expansion. Prior to conducting our analyses, we conducted visual and statistical analyses to test whether the trends in parenting time among the two groups were parallel prior to the ARRA-induced SNAP benefit expansion. For all parenting activities, both the parallel trends test and the Granger causality test were non-significant, suggesting that the parallel trends assumption is met.

Specifically, we estimate the association between the ARRA-induced SNAP benefit increase and parental time investments both on the extensive margin (i.e., whether parents engaged in an activity) and the intensive margin (i.e., how much time was spent conditional on any time spent engaging in an activity). To estimate the associations on the extensive margin, we use logistic regression models to predict whether a parent spent any interactive time with children in one of four categories (basic care, management, play, and teaching) or in total interactive time using dichotomous indicator variables. To estimate the associations on the intensive margin, we use linear regression models to predict continuous measures of the minutes spent in four parenting time categories or total interactive time, but we log-transform the outcome variables to address the non-normal distribution of the residuals. In all models, the coefficient of SNAP participation captures the association between household SNAP participation and the time parents spent with their children prior to ARRA. The coefficient of ARRA exposure captures the difference in average parenting time (or change in odds of engaging in a parenting category) between the periods before and during the ARRA expansion period for all respondents. The coefficient of primary interest is of the interaction between SNAP participation and ARRA exposure, which measures the additional association between SNAP participation and the time parents in these households spent with their children before versus during ARRA expansion period. All models also include covariates as described above, a year fixed effect to capture any nation-wide changes that may affect time spent with children, SNAP benefits, or SNAP eligibility in a given year, and a state fixed effect to capture any stable differences between states that influence time spent with children, SNAP benefits, or SNAP eligibility in a given state. Results tables report coefficients in odds ratios. For ease of interpretation, we also present the predicted probability or difference in predicted probabilities calculated using the Stata *margins* command in the text.

3.7. Subgroup analyses

Children living in single parent families receive less time-intensive caregiving time than those living with two parents (Carlson & Berger, 2013). Therefore, we examined differences in the association between the ARRA-induced SNAP benefit increase and parenting time for single parents compared with cohabiting and married parents. For this subgroup analysis, we only examine associations on the extensive margin. Because the sample is restricted to SNAP-eligible participating and non-participating households, the sample size is insufficient to estimate associations on the intensive margin.

4. Results

4.1. Descriptive results

Table 1 presents unweighted descriptive statistics for the matched sample by SNAP participation and indicates whether means are statistically different between the matched groups. Slightly more parents in SNAP-participating households were exposed to the ARRA-induced expansion in SNAP benefits than parents in SNAP near-eligible households (17.6 % vs. 13.4 %, $p < 0.05$). Respondent parents in SNAP-

Table 1
Descriptive statistics, unweighted.

	SNAP Recipients		Non-Recipients		Diff.
	Mean	SD	Mean	SD	
# of children in HH (0–13)	2.31	1.02	2.28	1.05	
% of HH with children under 5	28.52 %	45.19 %	32.86 %	47.00 %	
# of adults in HH	1.53	0.61	1.79	0.51	**
Respondent Characteristics					
Age	31.72	7.42	33.70	8.27	**
% Male	18.12 %	38.55 %	28.54 %	45.19 %	**
% Single Parent Households	58.39 %	49.33 %	30.49 %	46.06 %	**
% White	71.64 %	45.11 %	85.62 %	35.11 %	**
% Black	24.66 %	43.14 %	10.49 %	30.66 %	**
% Other Race	3.69 %	18.87 %	3.89 %	19.35 %	
% Hispanic	26.01 %	43.90 %	35.89 %	47.99 %	**
Parenting Time (minutes/day)					
Total	91.62	100.67	89.92	120.37	
Basic Care	52.61	67.73	46.01	75.95	
Manage	9.36	30.65	9.09	45.42	
Play	19.24	51.76	24.35	67.95	
Teaching	10.41	32.11	10.47	28.55	
Weekday Time Diary (%)	47.99 %	50.00 %	47.35 %	49.96 %	
ARRA Exposure	17.45 %	37.99 %	13.41 %	34.09 %	*
	N = 596		N = 925		

Notes: ** $p < 0.01$, * $p < 0.05$

participating households were slightly younger (31.2 vs. 33.7 years old, $p < 0.01$), less likely to be male (18.1 % vs. 28.5 %, $p < 0.01$), and more likely to identify as Black (24.7 % vs. 10.5 %, $p < 0.01$) and less likely to identify as Hispanic (26.0 % vs. 35.9 %, $p < 0.01$) relative to parents in near-eligible households. SNAP-participating parents were also more likely to be in a single-parent household rather than in a married or cohabiting household (58.4 % vs. 30.5 %, $p < 0.01$) and lived with fewer adults in the household (1.5 adults vs. 1.8 adults, $p < 0.01$). Considering parenting time, parents in SNAP-participating households spent slightly less time on play activities (19.2 min vs. 24.4) and more time on basic care activities (52.6 min vs. 46.0 min), but neither of these differences were statistically significant. Approximately half of all time diaries were completed on weekdays for both groups.

Table 2
Association between ARRA-induced SNAP benefit expansion and extensive margin of parenting time.

	(1) Total Parenting	(2) Basic Care	(3) Management	(3) Teaching	(5) Play
ARRA	0.685 (0.244)	0.397** (0.125)	2.187* (0.790)	1.444 (0.502)	1.617 (0.633)
SNAP Participation	1.286 (0.211)	1.189 (0.183)	1.002 (0.989)	0.858 (0.154)	0.834 (0.150)
ARRA * SNAP Participation	1.077 (0.440)	1.855† (0.680)	0.394* (0.169)	0.663 (0.294)	0.990 (0.458)
Observations	1,499	1,503	1,499	1,481	1,504

Notes: Weighted estimates. Coefficients presented as odds ratios. Robust standard errors parentheses.

** $p < 0.01$, * $p < 0.05$, † $p < 0.1$

4.2. Multivariate analyses

Table 2 presents results for the regression analyses examining the association between the ARRA-induced expansion in SNAP benefits amounts and parenting time on the extensive margin (i.e., whether parents engaged in any minutes of the given parenting activities on the diary day). Compared to parents in eligible non-participating households, SNAP-participating parents had 60.6 % lower odds of engaging in management activities ($OR = 0.394, p < 0.05$). This is equivalent to a 2.9 percentage point difference in the predicted probability of engaging in management activities. Although only marginally significant, SNAP-participating parents also had 85.5 % higher odds of engaging in basic care activities ($OR = 1.855, p < 0.1$). This is equivalent to a 1.5 percentage point difference in the predicted probabilities of engaging in management activities. There were no significant differences in the odds that SNAP-participating parents engaged in teaching or play activities before and after ARRA expansions compared with parents in non-participant households.

Table 3 shows that the ARRA-induced expansion in SNAP benefit amounts on the intensive margin of parenting time (i.e., the number of minutes parents spent in the parenting activities on a given day), conditional on having engaged in a parenting activity at all, was not associated with the amount of parenting time for parents in SNAP-participating households.

4.3. Subgroup analyses by family structure

Sub-group analyses conducted by family structure show that only children in single-parent SNAP-eligible households experienced a change in parenting time following the SNAP benefit increase. Table 4 presents sub-group analysis results for the regressions examining the association between the ARRA-induced expansion in SNAP benefit amounts and parenting time on the extensive margin by family structure. For parents in single-parent households, the interaction coefficient suggests that parents in SNAP-participating households had 289.2 % higher odds of engaging in basic care activities with ARRA expansion ($OR = 2.892, p < 0.05$) relative to eligible non-participating parents. This is equivalent to a 4.4 percentage point difference in the predicted probabilities of engaging in basic care activities. There was no similar increase in the odds of engaging in basic care activities for married or cohabiting parents with ARRA expansion. We applied the Chow test and found that the difference in coefficients between groups nears but does not reach significance ($p = 0.11$). Furthermore, parents in SNAP-participating households also had 71.4 % lower odds of engaging in management activities expansion ($OR = 0.286, p < 0.05$) relative to eligible non-participating parents, which is equivalent to a 4.3 percentage point difference in the predicted probabilities. In the case of management activities, the Chow test suggests that the difference between groups in the coefficient is marginally significant ($p = 0.06$).

Table 3

Association between ARRA-induced SNAP benefit expansion and intensive margin of parenting time.

	(1) Total Parenting	(2) Basic Care	(3) Management	(3) Teaching	(5) Play
ARRA	1.051 (0.180)	0.935 (0.235)	0.781 (0.290)	0.763 (0.210)	0.826 (0.256)
SNAP	1.031 (0.086)	1.050 (0.089)	0.932 (0.161)	1.125 (0.191)	1.249† (0.145)
ARRA * SNAP	1.036 (0.216)	1.024 (0.287)	1.947 (0.804)	1.428 (0.472)	1.137 (0.368)
Observations	1,086	897	388	295	303

Notes: Weighted estimates. Coefficients presented as odds ratios. Robust standard errors parentheses.
 ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$

Table 4

Association between ARRA-induced SNAP benefit expansion and extensive margin of parenting time by family structure.

	(1) Total Parenting	(2) Basic Care	(3) Management	(3) Teaching	(5) Play
<i>PANEL A: Single Parent Households</i>					
ARRA	0.635 (0.343)	0.236** (0.115)	3.131* (1.655)	1.384 (0.754)	3.752* (2.438)
SNAP	1.198 (0.307)	1.065 (0.244)	1.043 (0.243)	0.770 (0.195)	1.023 (0.305)
ARRA * SNAP	1.199 (0.712)	2.892* (1.560)	0.286* (0.171)	0.652 (0.421)	0.381 (0.286)
Observations	601	610	619	577	532
<i>PANEL B: Married or Cohabiting Households</i>					
ARRA	0.685 (0.315)	0.584 (0.229)	1.092 (0.443)	1.361 (0.551)	1.213 (0.465)
SNAP	1.505† (0.322)	1.376 (0.287)	0.948 (0.242)	1.047 (0.269)	0.716 (0.167)
ARRA * SNAP	1.217 (0.706)	1.669 (0.847)	0.903 (0.523)	0.709 (0.444)	2.044 (1.056)
Observations	869	872	852	833	848

Notes: Weighted estimates. Exponentiated coefficients presented. Robust standard errors parentheses.
 ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$

4.4. Sensitivity analyses

To test the robustness of these results, we tested our models using expanded post-ARRA period to include the full year after the SNAP benefit increase went into effect, until March 31, 2010. The results of these models were substantively similar to our preferred specification, though the magnitude and significance levels are somewhat reduced. This is likely because the SNAP benefit increase had a diminishing effect over time, possibly explained by either adaptation to the new benefit level or the decline in the real value of the SNAP benefit. Finally, we used the Romano-Wolf multiple hypothesis correction procedure in Stata and found that the results of the main models examining the full matched sample are robust. However, the results of the sub-group analysis are not robust to the correction for multiple hypothesis testing.

5. Discussion

In this study, we investigated whether an increase in SNAP benefit amounts introduced by the ARRA expansion in 2009 was associated with interactive parenting time spent with children in activities that facilitate their well-being and development using data from the American Time Use Survey. The hypothesized relationship between a SNAP benefit increase and parental time investments was ambiguous. On one hand, SNAP is associated with reduced working hours (Hoynes & Schanzenbach, 2012), greater economic well-being (Hoynes & Schanzenbach, 2009), reduced food insecurity (Ratcliffe et al., 2011), and reduced family stress (Wang et al., 2021), each of which could facilitate an increase in the time parents spent with their children. On the other hand, SNAP benefits were associated with an increase in meal preparation time (e.g., Beatty et al., 2014; You & Davis, 2019) and reduced parental engagement (Wang et al., 2021), suggesting a negative association between SNAP benefits and parental time investments. This is further underscored by evidence that EITC benefits were associated with modest decreases in time spent with children (Bastian & Lochner, 2020; Morrissey, 2022), with the exception of small increases in reading time (Morrissey, 2022).

Our main models show no association between the SNAP benefit increase and total parents' time investments, but we found that the SNAP benefit increase was associated with a decrease in the odds that SNAP-participating parents engaged in management time, which

includes organizing and planning for children, attending children's events, waiting for or with children, picking children up or dropping them off, and any activities related to children's health. The difference in the predicted probability of engaging in management time was 2.9 percentage points, which is a modest difference. Although only marginally significant, we also found that the SNAP benefit increase was associated with an increase in the odds that SNAP-participating parents engaged in basic care time, such as physical care of children, looking after, and otherwise caring for or helping children. The difference in the predicted probability of engaging in basic care time was 1.5 percentage points. We found no evidence that the ARRA-induced SNAP benefit increase was associated with the amount of time that parents in SNAP-participating households engaged in parenting activities. In other words, SNAP benefit increases may influence whether parents engage in certain kinds of parenting activities, but do not influence the time that parents spend on these activities if they do engage in them.

The sub-group analysis by household structure suggests that these changes in the odds of engaging in management and basic care activities were concentrated only among single-parent household. Specifically, we found a 4.3 percentage point decrease in the predicted probability that SNAP-participating parents in single-parent households engaged in management activities and a 4.4 percentage point increase in the predicted probability that these parents engaged in basic care activities. We found no changes in the odds that SNAP-participating parents in married or cohabiting households engaged in management or basic care activities. That we found both the positive association with basic care activities and the negative association with management activities to be limited to single parents is consistent on prior literature on the effects of SNAP on meal preparation time and working hours among single parents (Davis & You, 2010; Hoynes & Schanzenbach, 2012). The Chow test results support that the difference in the changed odds of engaging in management activities between single-parent and married or cohabiting households is significant, but do not show a significant difference between single-parent and married or cohabiting households on basic care activities. However, the sample size for these sub-group analyses are modest given the expected small magnitude of the effect, which can lead to the Chow test being underpowered. Given the Chow test results and the Romano-Wolff results, we interpret the sub-group results as suggestive of differences between these groups, especially in the case of management time, but that these results are not conclusive. Further research is necessary to study these differences between single-parent and married or cohabiting households using a larger sample size.

The magnitude of our findings are modest, but within expectations. The average increase in SNAP benefits across all SNAP households was approximately 16 % or \$80 per month (Nord & Prell, 2009). It is unlikely that such a small amount of money would lead to larger changes in the odds of engaging in parenting time than the 1.5 to 4.4 percentage point changes in predicted probabilities we found. Similarly, previous studies of SNAP benefits or EITC refunds on time use have also found relatively small effect sizes (Bastian & Lochner, 2020; Beatty et al., 2014; Morrissey, 2022). That said, only 26.7 % of parents in all SNAP-recipient households reported engaging in any management activities and 31.5 % of parents in SNAP-recipient single-parent households. Given these base rates, a 2.9 percentage point change in the predicted probability of engaging in management time is equivalent to a 10.9 % decrease among all SNAP-recipient parents.

There are two possible explanations for the observed reduction in the odds of engaging in management activities. First, this may be explained by a decrease in time available for parenting activities overall, because of the increased time cost of meal preparation associated with greater reliance on SNAP benefits (Beatty et al., 2014; You & Davis, 2019). These increases in meal preparation time were found only among single-parent households (Beatty et al., 2014), which is consistent with our finding of increased odds of engaging in management activities only among single-parent households. However, an alternative explanation is that influx of additional SNAP benefits led to reduced working hours,

especially among single-parent households (Hoynes & Schanzenbach, 2012) in such a way that management activities could become less time-burdensome. For example, if parents were able to reduce their work hours enough to make organizing and planning activities and the associated waiting, dropping off, and picking up less complex, these activities could also become less time-consuming. Similarly, it is possible that the increase in SNAP benefits, albeit not large, was sufficient to increase spending on transportation or other essential needs (Kim, 2016; Kim et al., 2019) in such a way that these management activities could take less time. For example, additional resources for a car or less budget constraints on purchasing gas could reduce time bringing children to activities relative to taking public transportation. This finding is consistent with the finding that EITC refunds were associated with reduced time spent on obtaining medical care for children (Bastian & Lochner, 2020). As such, a reduction in management time is not necessarily a negative reduction in parenting time as it relates to children's development. This is especially true considering that the reduction in management time is accompanied by an increase in time spent on basic care activities, which are arguably more important for children's well-being. That there was no reduction in basic care time, which includes looking after children as a primary activity, suggests that increased non-parental childcare time does not explain the observed changes in time use. An important area for future research is to examine how additional SNAP benefits are spent by parents to better understand the mechanisms that explain why SNAP benefit increases might be associated with changes in management and basic care time.

It is notable that we found no associations between the SNAP benefit increase and the time parents spent on developmentally enriching play and teaching activities. It could be that the size of the SNAP benefit increase was too small to influence family routines and parenting behaviors beyond basic care and management or that these activities are not directly influenced by financial resources. While this is consistent with Bastian and Lochner's finding that EITC refunds are not associated with play or teaching time (2020), although Morrissey did find an association with reading time among mothers with young children (2022).

Several limitations of this study should be noted. The results of this study only shed light on whether SNAP benefit increases may be associated with time spent on parenting activities. While we speculate on the possible mechanisms that explain the associations we found based on theory and prior research, analyses that assess the role of these and other potential mechanisms is outside the scope of this study. Further research is necessary to assess the degree to which the mechanisms we propose or other mechanisms contribute to the associations reported here. We also only focus on time spent with children where parenting activities are the primary focus and exclude any time when the child may be present in a primary activity that is not parenting-specific, such as meal preparation. While actively participating in such non-parenting activities may be of developmental benefit to the child, we chose to exclude such secondary parenting time, because we cannot ascertain from the data whether the child participated in the non-parenting activity or was merely present in the room, but not actively engaged.

The results presented here also should not be interpreted as causal. It is important to note that other changes that influence parenting time investments for SNAP-eligible parents could have occurred at the same time as the ARRA expansion of SNAP benefit amounts. For example, there was a temporary increase in EITC amounts because of a change in the credit formula that took place in 2009 as part of ARRA. Moreover, the period of analysis includes a time of economic recession and a time when participation in all anti-poverty programs increased substantially. While the inclusion of year fixed effects is able to account for economic and poverty-related factors that were stable within a given year, these results cannot be attributed to the SNAP benefit increase with certainty and the results may not be generalizable to a less financially strained economic context. The use of the CEM difference-in-difference approach to match SNAP recipients with an exact SNAP-eligible but non-recipient comparison group addresses many endogeneity concerns, but the

resulting small sample sizes, especially for the sub-group analysis, could reduce the precision and reliability of the estimates.

Additionally, there is likely some measurement error in the self-report measure of SNAP participation and there may also be measurement error in our identification of the eligible but non-participating group of parents based on the income measure. Both SNAP participation and household income are measured using self-report several months prior to the completion of time diaries. We make the assumption that households retain their participation in and eligibility for SNAP over the months between the two interviews. Given that income commonly fluctuates on a monthly basis among low-income households and, as a result, experience instability in their SNAP eligibility (Jolliffe and Ziliak 2008), continuous participation and eligibility through the ATUS interview period may not be the case. Though we control for a range of household and individual characteristics, to the degree that there are time-varying unobserved differences between the SNAP-participating and eligible, non-participating groups that influence parenting time, these may bias the results.

Despite these limitations, we argue that these results nevertheless contribute to the nascent body of evidence on the influence of financial resources from anti-poverty programs on parental time investments. Our findings suggest that an increase in SNAP benefits may be associated with small changes parental time investments for children and that this may be particularly so in single-parent households. Whether the effect of a SNAP benefit increase on parental time investments is positive,

negative, or neutral for children is not clear based on our findings. Whether a reduction in the odds that parents engage in management time translates to any meaningful changes for children depends on the underlying reason that parents do not engage in management time. On the other hand, an increase in the odds that parents engage in basic care time in response to SNAP benefit increases is likely to translate to benefits for children. Additional research is necessary to confirm these findings and to identify whether the reported associations are sustained over time. More importantly, research is needed to identify what mechanisms explain the relationship between SNAP benefit increases and changes in the odds of engaging in management and basic care activities to identify whether these may have meaningful positive or negative impacts on children.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

Table A1
Parenting time activities.

Parenting activity type	ATUS activity codes
Basic care	- Physical care for household children (030101) - Looking after household children (as a primary activity) (030109) - Caring for and helping household children, N.E.C. (030199)
Management	- Organization and planning for household children (030108) - Attending household children's events (030110) - Waiting for or with household children (030111) - Picking up or dropping off household children (030112) - Activities related to household children's health (030300)
Play	- Playing with household children, not sports (030103) - Arts and crafts with household children (030104) - Playing sports with household children (030105)
Teaching	- Reading to or with household children (030102) - Talking with or listening to household children (030106) - Helping or teaching household children (not related to education (2003) (030107) - Activities related to household children's education (030200)

Data availability

Data will be made available on request.

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