Center for Financial Security
UNIVERSITY OF WISCONSIN-MADISON
Retirement & Disability Research Center

Direct and Spillover Effects of Child Supplemental Security Income

Maliha M. Singh
PhD Candidate
University of Illinois at Chicago
mahmed72@uic.edu

Center for Financial Security

University of
Wisconsin-Madison

1300 Linden Drive
Madison, WI 53706

608-890-0229
cfs@mailplus.wisc.edu
cfs.wisc.edu

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Abstract

Children having a sibling with a disability are often disadvantaged as parents need to divert a high proportion of their resources, time, and energy on the child with a disability in the family (Abrams, 2009). Prior research has demonstrated that siblings of disabled children who live in better economic situations tend to have better outcomes. This paper looks into the long-term effects of households receiving child Supplemental Security Income (SSI) on the disabled and non-disabled children in the family. In 1990, the Zebley reform took place which made it easier for children with intellectual disabilities to obtain SSI. This historic decision passed by the U.S. Supreme Court in the Sullivan vs Zebley case allowed children with intellectual disabilities, previously not considered disabled for SSI purposes, to receive child SSI benefits for disability. This paper exploits the quasi-experimental variation induced by the Zebley decision to employ a difference-in-difference model. Implementing the model, it estimates the intent-to-treat estimates of being eligible for Zebley for an additional year on the outcomes of the children with Zebley affected intellectual disabilities and their siblings with no disabilities. The results of this paper shed light on the positive impacts of the Zebley reform on the children whose eligibility for SSI was impacted by Zebley, as well as and the spillover effects accruing to the other siblings in the family. Being eligible for SSI for an additional year not only increases the number of years of schooling completed by the Zebley-impacted child, but also increases the probability that the other siblings in the family complete high school by age 19, earn a higher income, and have private health insurance coverage at the age of 25.

JEL classification: D62, H53, I38
Keywords: child, supplemental security income, education, earnings, spillover, siblings

1 Introduction

Parents in households with a child with a disability have been demonstrated to experience higher levels of stress than their counterparts (Beck, Daley, Hastings, and Stevenson, 2004; Dyson, 2010; McConkey 2010; Truesdale-Kennedy, Chang, Jarrah & Shukri, 2008; Quintero & McIntyre, 2010). Parents in families with a disabled child are prone to devoting less time and attention to the non-disabled siblings and treating them differently, for example by expecting them to help care for their sibling or having higher expectations of their behavior (Hames and Appleton, 2009; Kresak, Gallagher & Rhodes, 2009; Schunterman, 2007).

Studies have found that there is a strong correlation between poverty and disability. Being in poverty tends to increase the likelihood of having a child with a disability and also having a disabled child in the family tends to increase the likelihood of the family being in poverty (Emerson & Hatton 2020; Emerson and Shahtahmasebi, Lancaster, & Berridge 2010). Siblings of disabled children who live in better economic situations tend to have better outcomes in terms of behavioral problems and personal growth (Findler & Vardi, 2009; Quintero & McIntyre, 2010). Also, siblings of disabled children in more advantaged families have greater access to protective resources than poorer families (Dyson, 2010; Williams et al., 2002).

Supplemental Security Income (SSI) is one of the most prominent public assistance programs administered by the Social Security Administration (SSA) that explicitly targets children with disabilities living in poverty. As of Dec 2019, the SSI pays out around $9.4 billion annually to 1.1 million child beneficiaries. (SSA Annual 2020, Table IV.C1, Table IV.B9). Although previous research has clearly demonstrated the benefits of policies aiming to improve health and alleviate poverty and has investigated the effect of having a disability in adulthood on labor market outcomes, very few studies have looked into the long-run effects of programs targeted at children with disabilities on the other non-disabled siblings in the family. In this paper, I estimate the causal effect of households becoming eligible to receive SSI benefits for the children with disabilities to whom the benefits are directly targeted and the other non-disabled children in the household.

In 1990, the US Supreme Court passed a historic decision in *Sullivan vs Zebley* (known as the Zebley reform) which changed the standards required for children to be considered disabled, making it easier for children with intellectual disabilities to qualify for SSI under this

new criterion. Children with certain intellectual disabilities, who previously were not eligible for child SSI benefits, were disproportionally affected by the Zebley reform. In this paper, I exploit the Zebley reform as an exogenous variation in the probability of receiving SSI for households who had at least one child with an intellectual disability impacted by Zebley reform. Using the exogenous variation created by the Zebley reform I investigate the effect of receiving SSI during childhood on earnings as adults, years of schooling completed, college, high school graduation, having private health insurance coverage, being on welfare as adults for both those children affected by Zebley and their siblings.

Using quasi-experimental variation induced by the Zebley reform enables me to obtain the causal effects of obtaining eligibility for benefits on outcomes in later life of the children impacted by Zebley and their siblings. For households that had children with disorders likely to be affected by Zebley decision, the reform lead to an exogenous increase in the number of years and amount of SSI received until the child turned 18. I find that when a household is exposed to the Zebley reform for an additional year (due to the type of disability of one of the children and the child being a year younger), it increases the number of years of schooling completed by 0.4 years and reduces the probability of completing college by age 25 by 0.9 percent. On the other siblings in the household who did not have a disability themselves but lived in the same household as the Zebley affected child, each additional year of Zebley exposure increases the probability of completing high school by age 19 by 1.9 percent, increases early life income by four percent and increases the probability of being covered by private health insurance at age 25 by 2.2 percent.

I implement a strategy inspired by the difference-in-difference approach grouping households by whether they had a child with a disability affected by Zebley. Given that Zebley reform effects were conditional on children being between age five and 17, and thus that children younger at the time of the reform were eligible for Zebley for a greater period of time, I identify the intent to treat estimates of being exposed to Zebley for an additional year on outcomes.

The primary threat to my identification strategy is the gap between children with intellectual disabilities and those with no disabilities varying systematically by the age of the child in 1992. In my paper, I address the possible threats to my identification strategy and discuss how my results are not driven by these factors in the Robustness Check section.

My paper is related to recent papers by Deshpande (2016a), Levere et al. (2017), and Coe et al. (2013). Deshpande (2016a) looks into what happens when individuals are removed from SSI upon turning 18 and finds that although there are some gains in earnings the gain in earnings is more than outweighed by the amount of SSI benefits lost. My paper adds to this literature of child SSI benefits by answering a different research question looking into the effect of what happens in terms of long-run earnings and educational outcomes when children with intellectual disabilities become eligible to receive SSI. The impact of gaining SSI benefits in childhood, which I look into in my paper, is likely to be different from Despande's (2016a) focus on the impact of losing benefits as one enters adulthood. Coe et al. (2013) investigate the effect of receiving SSI as children due to the Zebley reform on the adult life outcomes implementing a difference-in-difference strategy using children with more severe disabilities (thereby not affected by Zebley) and entering SSI in a different period as a control group for children entering SSI during Zebley having disabilities that were impacted by the Zebley reform. This paper uses a completely different identifications strategy using different treatment and control groups and a different dataset; hence this paper contributes to the literature identifying the effects of SSI on children directly impacted. Levere et al. (2017) use SSA data to look into the impact of the Zebley reform on those children who were previously denied benefits prior to the Zebley reform using a difference-in-difference strategy that groups applicants who were previously rejected by diagnosis type and age at the time of the Zebley reform. Individuals who were already 18 or above were not affected by the Zebley decision and they use those individuals as a control group to control for any inherent differences between those with mental and non-mental disorders (Levere et al. 2017). Levere et al. obtain results based on the sample of previously rejected applicants only which is different from my sample group, whereas I investigate individuals whose eligibility for SSI is affected by the Zebley reform due to their type of intellectual disability regardless of whether they previously applied for SSI or not. As such, the result of my paper adds to their results and literature on the effects of child SSI benefits as I am using a different identification strategy and dataset. Furthermore, I am considering the spillover effects on the other siblings in the family whose SSI eligibility status has not changed due to the Zebley reform but was affected through living in the same household as the Zebley-affected sibling, which differs from the concentration in previous literature.

My paper adds to the literature on the long-term effects of child SSI benefits targeted to children with "less severe" disabilities. I present a model wherein the effect of receiving SSI on the Zebley-eligible child and their non-Zebley affected siblings due to receiving SSI in childhood are ambiguous. I then present estimates of the impacts of being exposed to Zebley for an additional year on the educational and earning outcomes of the Zebley-impacted child and the other siblings in the family. To my knowledge, this is the first paper to look into the spillover effects of Zebley reform in terms of its effect on siblings of child SSI recipients who were not receiving SSI themselves. I find that being eligible for SSI for an additional year not only increases the number of years of schooling completed by the Zebley-impacted child but also increases the probability that the other siblings in the family complete high school by age 19, earn a higher income, and have private health insurance coverage at the age of 25.

Even though this paper studies the long-run effects of Zebley reform, a policy change that occurred in 1990 and is thus more than 25 years old, the results of this paper can be used to inform policy discussion regarding disability programs administered by the SSA. Since the Zebley reform only impacted children with certain intellectual disabilities, studying the effects of this reform can shed light on the cost-benefit analyses of current programs targeting children with intellectual disabilities.

2 Institutional Context

Supplemental Security Income (SSI) is a means-tested program federally administered by the Social Security Administration (SSA) which provides cash (usually accompanied by Medicaid) to low-income individuals who meet the eligibility standards with respect to age and disability status. It was created in 1972 when Congress passed the legislation aiming for SSI to be an additional means-tested component of the social safety net providing an additional source of income for poor families. It is a large program providing $56 billion in benefits annually to around 8.1 million beneficiaries as of 2019 (SSA Annual Report 2020, Table IV.C1, Table IV.B9). Elderly, blind, or disabled individuals are those who are eligible for SSI.

SSI has two programs targeting three distinct populations: blind or disabled children; blind or disabled non-elderly adults; and individuals 65 and older. The SSI program has become

an increasingly important part of the social safety net, especially for non-elderly adults and children. The percentage of children receiving SSI has more than tripled from 1988, where only 0.4 percent of children received SSI, to 1.8 percent in 2013.

The asset limit criteria required to become eligible to receive child SSI benefits are the same as that for adults, and the assets comprise of both assets in the name of the child and parent-owned assets that are deemed to the child. Also, countable income for child SSI applicants is the parental income deemed to the child. The amount of SSI benefit that the child is eligible to receive is calculated using the amount by which the federal benefit rate outweighs the countable income. According to the data, more than two-thirds of child SSI recipients were living in single-parent households (SSA Annual Statistical Report 2019, Table 24).

Previous studies looking into the short-term effects of child SSI benefits have shown that it increases net family income and decreases poverty rates (Schmidt, Shore-Sheppard, and Watson 2013; Duggan and Kearney 2017). Using Survey of Program Participation (SIPP) data, Duggan and Kearney (2017) found that children receiving SSI increases household income by 20 percent on average. Findings from this study also show that when for every 100 children who receive SSI, 22 children and 37 individuals overcome the poverty line, and an additional 28 individuals' income rose more than twice the poverty line. Another study by Schmidt, Shore-Sheppard, and Watson (2013) finds a lower likelihood of food insecurity among SSI program participants.

On the other hand, studies on the effect of receiving SSI on parental labor supply found mixed results (Duggan and Kearney 2007; Deshpande 2016b). Deshpande (2016b) found that when a child is removed from the SSI program there is a loss in the child's payment which is outweighed by the increase in parental earnings driven by intensive margin responses in the labor market. These findings are different from the results obtained in Duggan and Kearney (2007), who find that the negative parental labor supply response to gaining child SSI benefits is much smaller. Deshpande (2016b) explains the discrepancies between their findings by asymmetric parental labor supply responses to gain in child SSI benefits versus losing child SSI benefits. Also, Deshpande (2016b) finds that when a child stops receiving SSI, it also lowers DI application rates from parents and siblings.

Deshpande (2016a) found that SSI youth when removed from the program earn on average more relative to the earnings of those who remain on the program, but it is not enough to

make up for the $7700 lost in annual SSI benefits. However, those removed from the program spend an average of around 16 years with observed income below 50% of the poverty line compared to only around five years for those who are not removed from SSI at age 18. The average effects covered the heterogeneous responses. While removal from the program increased the probability of maintaining earnings above $15000 by 11 percent (and this difference grew over time), on the other hand, income volatility also increased after being removed from the SSI program.

Although studies have considered the effects of child SSI benefits on poverty, household income, and parental labor supply, there has been no research on how the child SSI income, which decreases the household budget constraints, is used. In order to have a better understanding of how SSI can have an effect on health, education, consumption, children's human capital, and children's future earnings it is essential to understand how the child SSI payment is spent.

To evaluate the effects of children receiving SSI, we need to obtain a fuller picture by looking into the long-term outcomes.

Identifying the causal impact of child SSI receipt on long-term outcomes is a significant challenge for researchers because of selection bias. Even though it is challenging for researchers, it is essential to investigate the impact of child SSI on not only the long-term outcomes of the qualifying children themselves but also on other siblings who grew up in the same household in order to have an accurate cost-benefit evaluation of child SSI benefits to look.

3 Zebley Reform

During the early 1990s, two policies were enacted which created a significant impact on the Supplemental Security Income (SSI) caseload. In 1990, the Supreme Court passed a decision in *Sullivan vs Zebley* which resulted in the first impactful policy change: the Zebley reform. The second important policy was the implementation of new childhood mental impairment regulations.

The basic premise for the Zebley reform was the inconsistency between the eligibility determination of adults and children for SSI. Whereas the adult determination process had two steps at which the adult could qualify for benefits until 1990 the child determination process only

allowed for listed medical impairments and did not take into account any further functional assessment that would also consider unlisted comparable impairments.

The first step in the process for adult determination looked into whether the adult suffered from several listed medical impairments and had an impairment that is equally restrictive in terms of gaining employment. There was also a second step in which adults could qualify on the basis of a functional assessment of their ability to engage in work considering the individual's age, education, and work experience. Since the listing-only approach for the child determination process did not consider children eligible for SSI based on "comparable severity" (as it did in the case of adults), the Supreme Court declared the child determination process to be stricter than the adult determination process. As a result, it changed the rules in order to make it possible to conduct functional assessments of children based on the child's ability to perform age-appropriate activities.

The Supreme Court decision in *Sullivan vs Zebley* was announced in February 1990, and following that decision several policy changes were implemented that changed how eligibility for SSI was determined for children. In May 1990, the Social Security Administration built interim regulations in the system to implement the changes resulting from the Court's decision. According to this interim standard, children who were previously denied SSI for not having an impairment included on the list of impairments could no longer be denied benefits without first being given a functional assessment. Any child who previously qualified would still be eligible under the new regulations, but under the new interim standard, an extra eligibility standard. This added standard resulted in the child determination process being more lenient and thus comparable to the adult determination process.

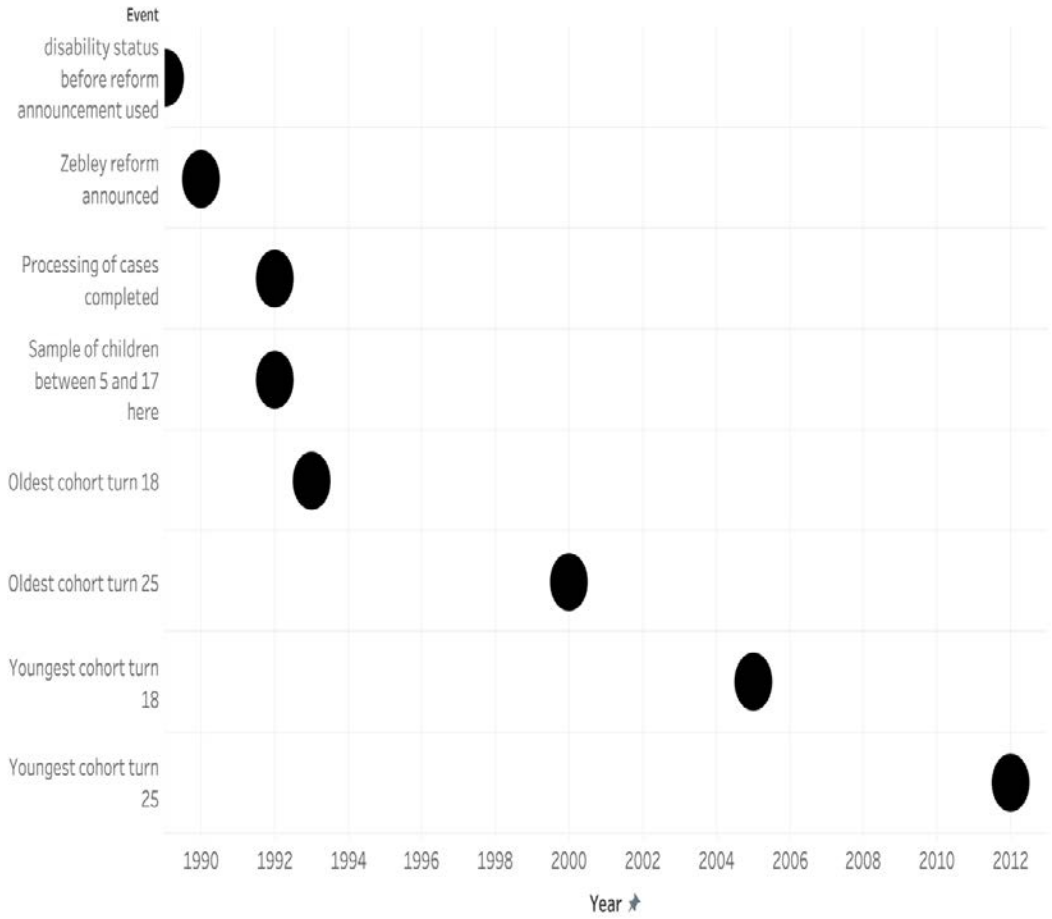
New mental impairment regulations were implemented in December 1990. While this was not directly the result of the Zebley reform, it created a similar impact. These new regulations included expanding the list of mental impairments that would consider a child's age-appropriate activities in determining disability status. The changes implemented were similar to Zebley eligibility in nature, but the main aim was to expand the eligibility of children with mental impairments.

The final regulations resulting from the Zebley reform were adopted in 1991. Nationwide staff had undergone training in the new regulations organized by Social Security Administration (SSA) from February 1991 through April 1991. The agreements regarding the terms of the

specific Zebley court case settlement were agreed upon in March 1991. A crucial component of the settlement was a major outreach program to children whose SSI applications were denied due to medical reasons from January 1980 through February 1991. The denied applications would be offered redetermination according to the new standards. In July 1991 notices to these previously denied applicants were sent and around 40 percent of those cases responded to the redetermination opportunity notices sent by September 1991.The SSA estimated that by December 1992 the reprocessing of all previously denied applications would be completed. The final rules with regards to the changes due to the Zebley decision were published in the Federal Register in September 1993.

Although these rules comprised a revision of February 1991 rules, they were not essentially different. A timeline of the Zebley decision with the important dates relevant to this paper is given in Figure 1. For the purpose of this paper, I refer to all these changes combined as the Zebley reform.

Figure 1 Timeline of Zebley reform

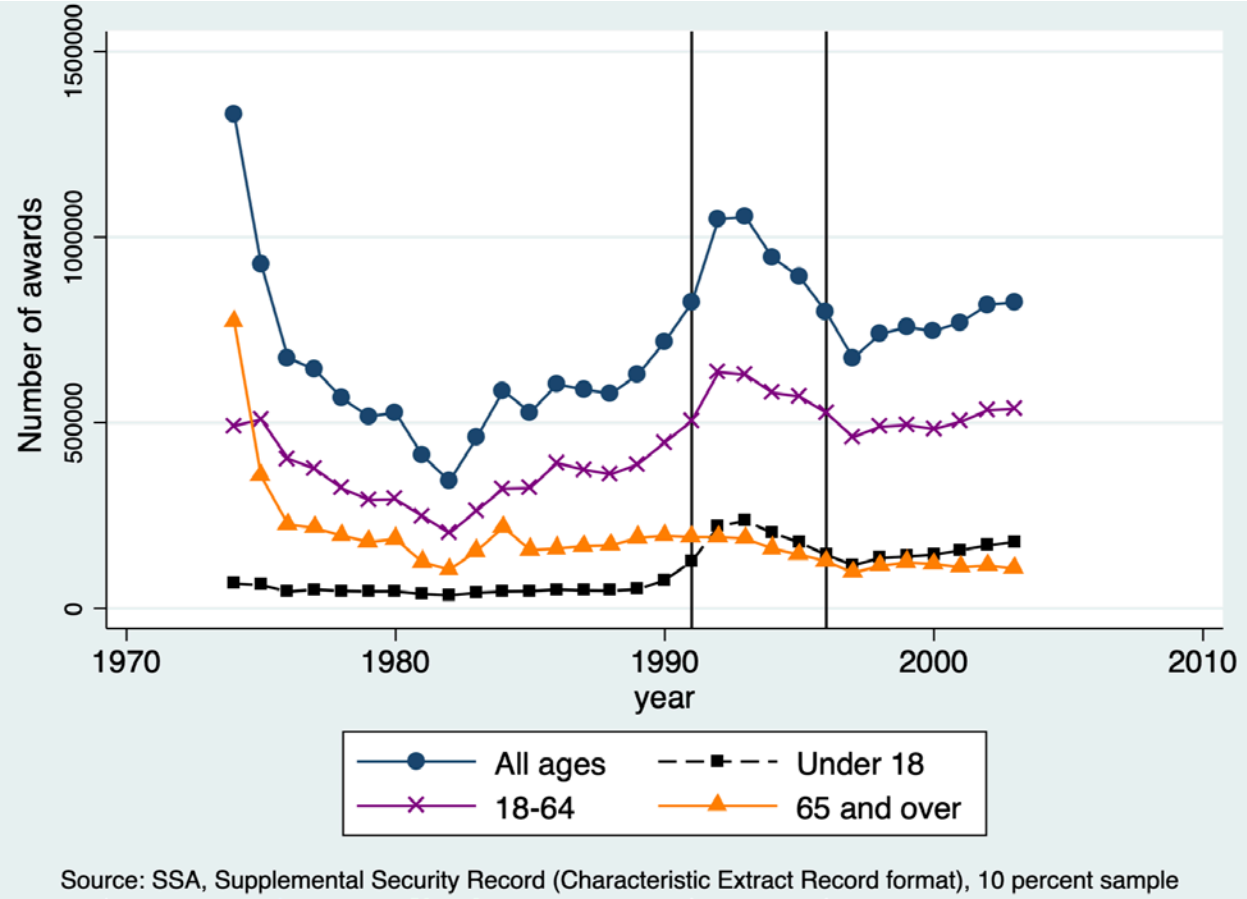


Notes: The chart shows the timeline of the Zebley reform. In 1990 the Zebley reform was announced. The pre-reform announcement disability status is used in this paper for estimation. By 1992, processing of all cases was completed, and my estimation sample was between the ages 5 to 17 (inclusive) at that time. The oldest cohort in my estimation sample turned 18 in 1993 and 25 in 2000. The youngest cohort in my estimation sample turned 18 in 2005 and 25 in 2012.

4 Zebley Decision and impact on SSI take-up

As a result of the change in criteria for children's eligibility for Supplemental Security Income (SSI), there was a large increase in the number of child SSI awards based on Social Security Administration (SSA) data. As shown in Figure 2, after 1991 there was a steep increase in the number of individuals receiving SSI under the age of 18. Although there was an increase in the age group 18-64 as well, the increase for the under 18 age group happened only after 1991 whereas there was a positive slope for the 18-64 age group from before 1991. This is in line with the work of Brady et al. (1998) who found that caseloads increased for the age group 18-64 as well.

Figure 2 Federal SSI awards by age (10 percent sample)



Notes: The figure is a scatterplot showing the number of SSI awards for different age groups by year. The data is taken from SSA and covers 10 percent of the sample from 1974 to 2003. For the age group 65 and over there is no increasing trend in the number of SSI awards pre-Zebley reform and post 1991 after the reform. For the age group 18-64, there is an increasing trend post-1982 which continues till 1992. For the age group under 18, which is the group affected by Zebley, there was no increasing trend prior to the Zebley reform but after the reform, we see a steep increase in the number of awards.

Level (2017) demonstrated that among new awards, the percent of those going to children with mental disorders increased to 34 percent in 1994 from 9.5 percent in 1989 and reached more than 50 percent in 2003. It was estimated by the Government Accountability Office (1994) that 70 percent of new beneficiaries were accepted because of the change in childhood mental impairment listing rather than because of individualized functional assessment (IFA). It is likely that since the enrollments and applications from children to SSI increased after the Zebley reform the composition of the applicants also shifted as children with less severe mental disabilities applied and qualified for benefits.

Following the Zebley reform, the SSA made another major policy change in 1996. Since there were drastic increases in child beneficiaries, Congress passed new legislation that restricted the eligibility criteria for the SSI program. Individuals who turned 18 after 22 August 1996 need to have their eligibility determined again under this legislation (Deshpande 2016a). Also, there were some rules in the program changes that were expected to reduce disability rolls by 100,000, and individuals with mental disorders were most likely to lose benefits after 1996 with Continuing Disability Review (Hemmeter et al. 2009). In my analyses, therefore, I attempt to evaluate the intent-to-treat effects of being eligible for Zebley reform for an additional year on later life outcomes of the disabled children and the other non-disabled siblings in the family.

5 Conceptual Framework

The effect of household receiving Supplemental Security Income (SSI) on children's long-term outcomes is theoretically ambiguous. Previous literature has demonstrated that there might be welfare trap in the sense that when children grow up in a household receiving welfare, they are more likely to be on welfare themselves as adults (Moffitt 1983; Duncan et al. 1988; Antel 1992; Wu 2009;Durlauf and Shaorshadze 2014).This is not only due to poverty trap but also a welfare trap might be present. Some studies have elaborated on the potential mechanisms through which intergenerational transmission of welfare dependence occurs (Moffitt 1983; Duncan et al. 1988; Antel 1992; Durlauf and Shaorshadze 2014). Also, identifying a child with mild behavioral problems as disabled may lead to lower expectations and lower educational attainment for the child (Wu 2009).

On the other hand, Duggan and Kearney (2007) find that enrollment of a child on SSI leads to an increase in total household unearned income by $1872 over four-month period. They also find that SSI is effective at reducing child poverty rates. Their findings show that following the enrollment of a child in SSI there is a statistically significant reduction of around 11.4 percentage points in the probability that a household is in poverty.

In addition to the effect on total household unearned income, SSI recipients become immediately eligible for Medicaid program, so it is highly likely that child SSI enrollment leads to an increase in the health insurance coverage of children. This may also positively impact their educational and earning outcomes.

As a result of these varied findings, the effect of receiving SSI on educational, earnings and other long-term outcomes of the child receiving SSI in the household and other siblings without any disability can go either way. I develop a model where I illustrate this ambiguity. Suppose we have a household maximizing utility where:

$$Max_{(C_P, Y_M, Y_N)}(EV) = \int U(C_{p,} Y_M, Y_N) dG\{Y_M | I_M(T), I_N(T)\} \quad \text{(E1)}$$

Where,

$M + N$: Total number of kids in the household

M : Denotes kids in household with a disability

N : Kids in household without any disabilities

C_p: Parents own consumption

Y_M, Y_N: Parents Expected future income of M and N kids respectively

I_M , $I_{N,}$: Parental Investments on M and N kids respectively

T: SSI child disability payments to household

$dG\{Y_M | I_M(T), I_N(T)\}$: Parents' beliefs that kids M will earn Y_M given parental investments in them I_M , parental investments on the other siblings I_N (through spillovers), and SSI disability payments

For simplicity of analyses let us assume the following:

Utility function: $U(C_p, Y_M, Y_N) = (1 - 2\alpha)\, log(C_p) + \alpha\, log(Y_M) + \alpha\, log(Y_N)$ (E2)

Budget constraint: $T + Y_p = (C_p + I_M + I_N)$ (E3)

Human Capital Production Function: $h_M = A I_N^{\gamma} \theta\, log(I_M)$ and $h_N = A\theta I_M^{\gamma}\, log(I_N)$ (E4)

where $0 < \gamma < 1$ and $\frac{\delta h_i}{\delta I_j} > 0$

Future Income of children: $log(Y_M) = \mu + \rho h_M$ and $log(Y_N) = \mu + \rho h_N$ (E5)

Now let us see what happens to Investments in children in the family with disability (I_M) and Investments in the children in the family without any disability (I_N) when SSI payments (T) increase.

Taking the first-order condition we have:

$\frac{\partial I_M^*}{\partial T} > 0\ (holding\ I_N)\ constant\ ,\ \frac{\partial I_N^*}{\partial T} > 0$ (holding I_M) constant (E6)

(Increased financial resource effect)

However,

$\frac{dG\{Y_M|I_M(T),I_N\}}{dT}<0$ (E7)

(Disability labelling effect as T for the Zebley eligible children increases from 0 to positive, the negative effect of T on the parents' belief shows as T is >0 for Zebley children after the reform).

Parents' beliefs that a child with disability will earn a given income given investment I_M and I_N might decrease if a child with less severe intellectual disability (those impacted by Zebley) starts receiving SSI. This is because a child receiving SSI for mild intellectual disabilities like ADHD, autism, etc. may mean parents perceiving a child as disabled and reducing future income expectations for any given level of investment. Under standard economic assumptions, lower expected marginal benefit of each additional dollar of investment on children is likely to lower investment on the disabled children.

Hence, it is ambiguous whether investments toward the children with disabilities will increase due to receiving child disability benefits. For investments on the siblings with no disability (holding I_M constant) I_N increases. However, I_M might decrease resulting in lesser marginal benefit of investment I_N which might decrease I_N (sibling spillover effect).

In summary, my model predicts that when a household starts receiving SSI benefits for a child with disability affected by Zebley the following effects occur:

1) Disabled labelling effect: due to the Zebley reform children with classified mild intellectual disabilities were eligible to receive SSI. Labelling a child with mild intellectual disability as 'disabled' may encourage parents to investment less on them
2) Additional Financial Resource effect: increases optimal investment on children
3) Sibling human capital effects: spending on one child may have positive spillovers on the other children

It is interesting to see how these effects interact with one another in terms of long-term outcomes and my paper sheds light on these effects.

6 Data

I use the National Longitudinal Survey of Youth 1979 (NLSY79) and the National Longitudinal Survey of Children and Young Adults 1979 (NLSY 79 C/YA), linking both the datasets to analyze the impact of household receiving SSI when the individuals were children on high school and college graduation, high school grades, earnings, being on welfare, having health insurance coverage, and other educational outcomes as adults. The NLSY79 is a nationally representative longitudinal dataset which contains data on whether the household received Supplemental Security Income (SSI) in a given year, household income, education, and other demographic and socioeconomic characteristics.

The NLSY 79 C/YA is a separate survey of all children born to female respondents of the NLSY79 that started in 1986. This survey contains data regarding household cognitive stimulation scores, childhood disability and Peabody Individual Achievement Test (PIAT) scores when the individuals are children and also earnings, high school grades, highest grade completed, welfare, attitudes, and other later life outcomes for the later years when those children are adults. From the NLSY79 C/YA, I obtain data on the later life outcomes, childhood disability, pre-reform household cognitive stimulation scores and PIAT test scores, and link these to NLSY79, which contains data on whether the household received SSI in a given year.

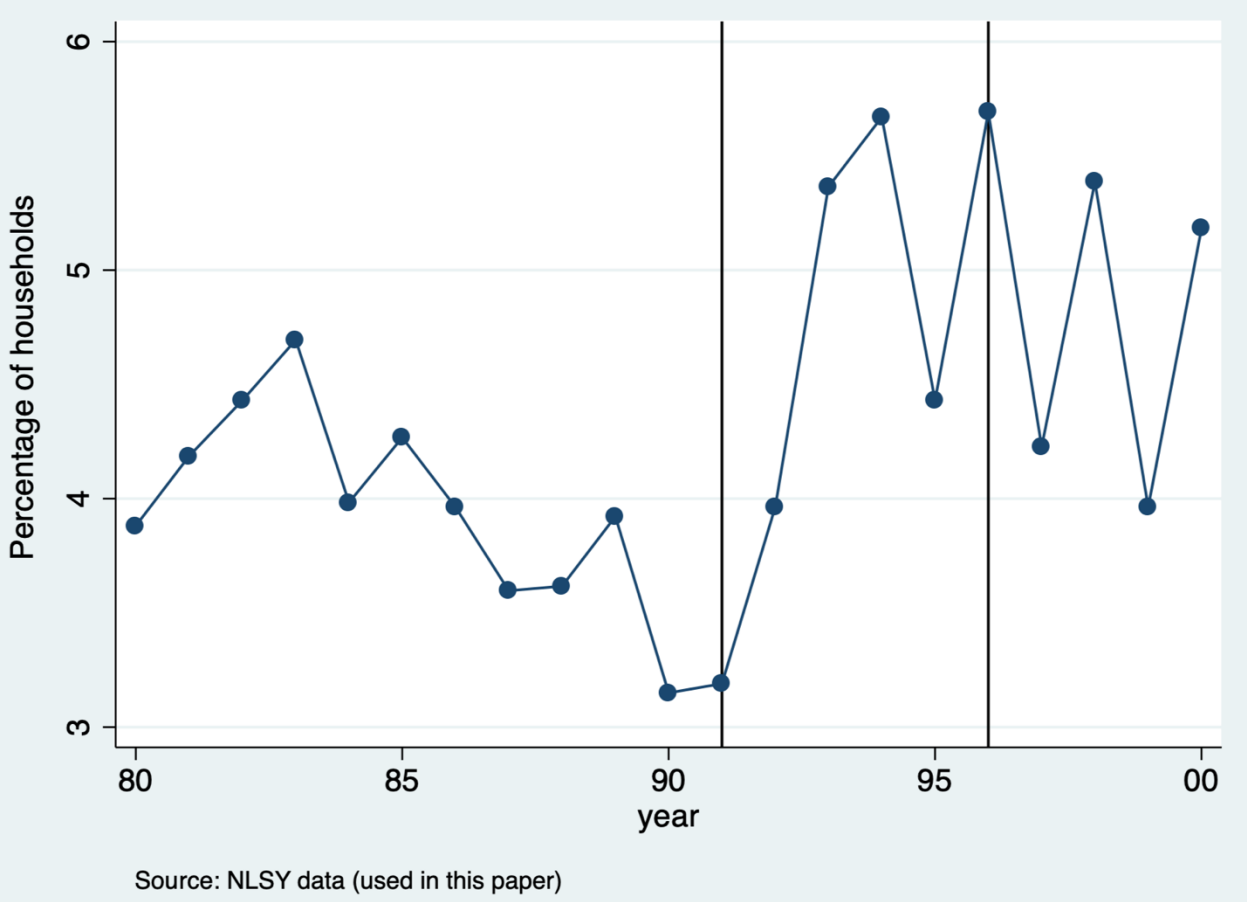
6.1 Descriptive statistics

Linking the NLSY79 to the NLSY79 C/YA, I have a sample of 4,928 households. I cannot separately identify which member of the household was receiving SSI, and thus I define a household as receiving SSI if any member of the household reported receiving SSI. Although I cannot identify which member of the household was receiving SSI, I can identify the disability conditions of all members in the household separately. By looking into the disability conditions of all members of the household, I can identify which child in the household had a Zebley reform-affected condition, and which child in the household had no Zebley impacted condition. Since the Zebley reform started to take effect in 1991, years post-1991 are considered Zebley years in my paper.

As seen in Figure 3, following 1991 there was a drastic increase in the proportion of households receiving SSI in my dataset from 3.2 percent in 1991 to 4 percent in 1992, 5.4percent

in 1993 and 5.7 percent in 1994. In contrast, from 1983 to 1991 there was a declining trend in the proportion of households receiving SSI.

Figure 3 Percentage of households receiving SSI in a given year

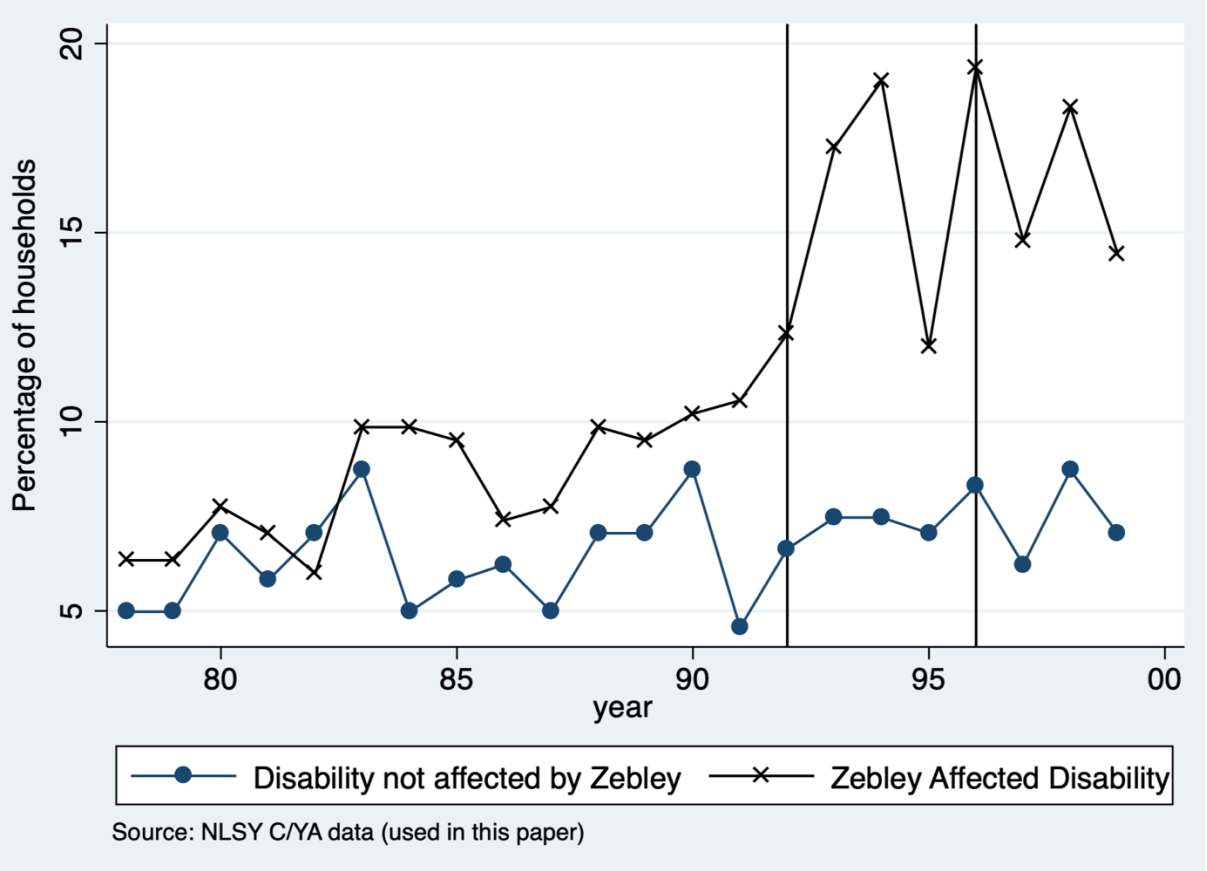


Notes: The figure is a scatterplot showing the percentage of households receiving SSI in a given year from the years 1980 to 2000. Post-1991 there was a sharp increase in the proportion of households receiving SSI from 3.2 percent in 1992 to 5.4 percent in 1993. Prior to 1991, there is a declining trend in the proportion of households receiving SSI.

In figure 4, I look into SSI receipt status by year for the subsample of households having a disabled child, dividing disabilities into those affected by Zebley and not affected by Zebley. Figure 4 shows that households with at least one Zebley affected child had a sharp increase in terms of the proportion receiving SSI post-1991 whereas there was no upward trend for households having at least one child with non-Zebley affected disabilities. Prior to 1991 the trends were quite similar for the two groups. Since intellectual disabilities (excluding mental retardation) were affected by Zebley reform, I classify a household as having a Zebley reform-

affected child if mother reported any of her children as having learning disability, brain dysfunction, hyperactivity, speech impairment, emotional disturbance, as seeing psychiatrist for emotional problem, as taking medicines to control behavior, or if mother felt any of her children needed help to control behavior.

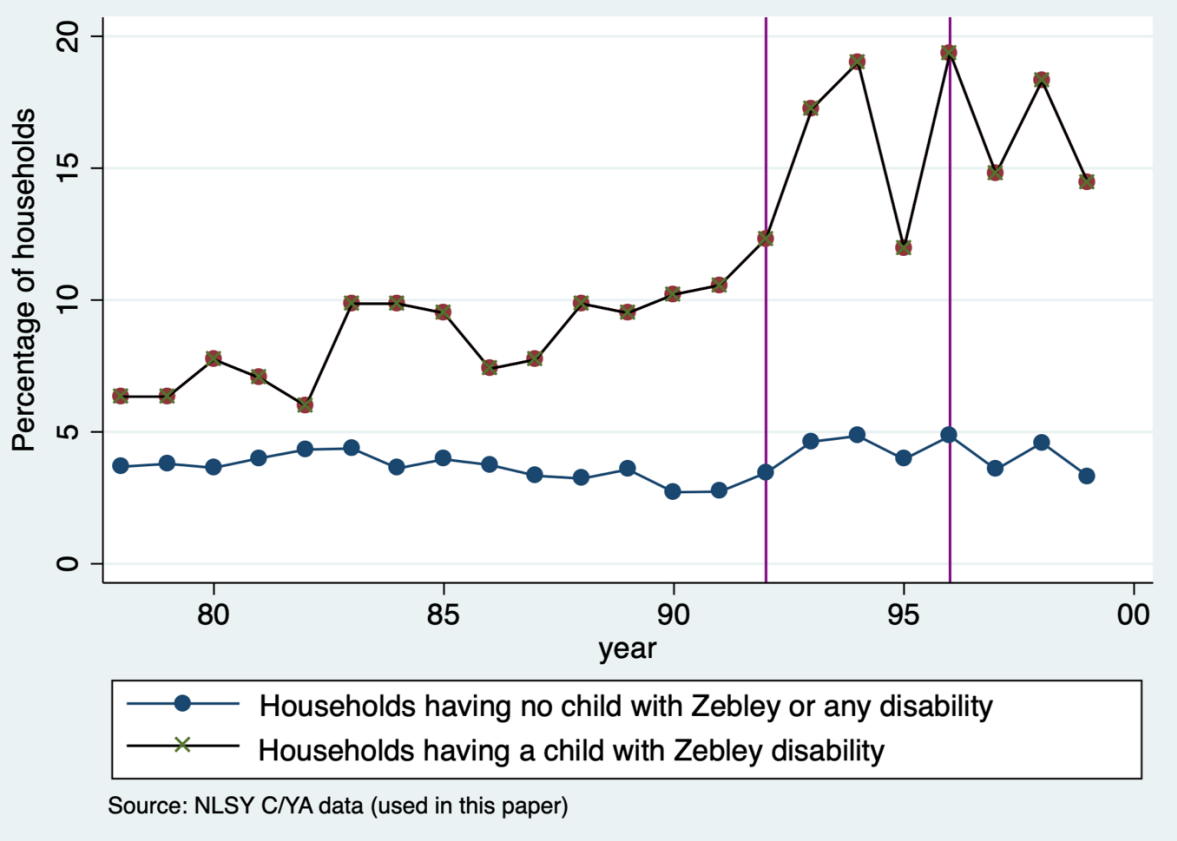
Figure 4 Percentage of households receiving SSI by disability type



Notes: The figure is showing the percentage of households receiving SSI in a given year from the years 1978 to 1999 grouping households by disability type. There are two groups of households represented in this diagram with separate lines: households having a child with Zebley affected disability and households having a child with a disability not impacted by Zebley. Post-1991 there was a sharp increase in the proportion receiving SSI for households with Zebley-affected disability. For households having no child with a Zebley-affected disability but with other disabilities, we see no increase in the proportion receiving SSI.

In figure 5, I take the entire sample and divide it into households having a child with Zebley disorder and households not having a child with Zebley disorder (which includes both no disorder and non-Zebley disorder). Figure 5 shows that post-1991 while there was a large increase in the proportion of Zebley affected households receiving SSI, it was not present for households not having a child with Zebley disorder.

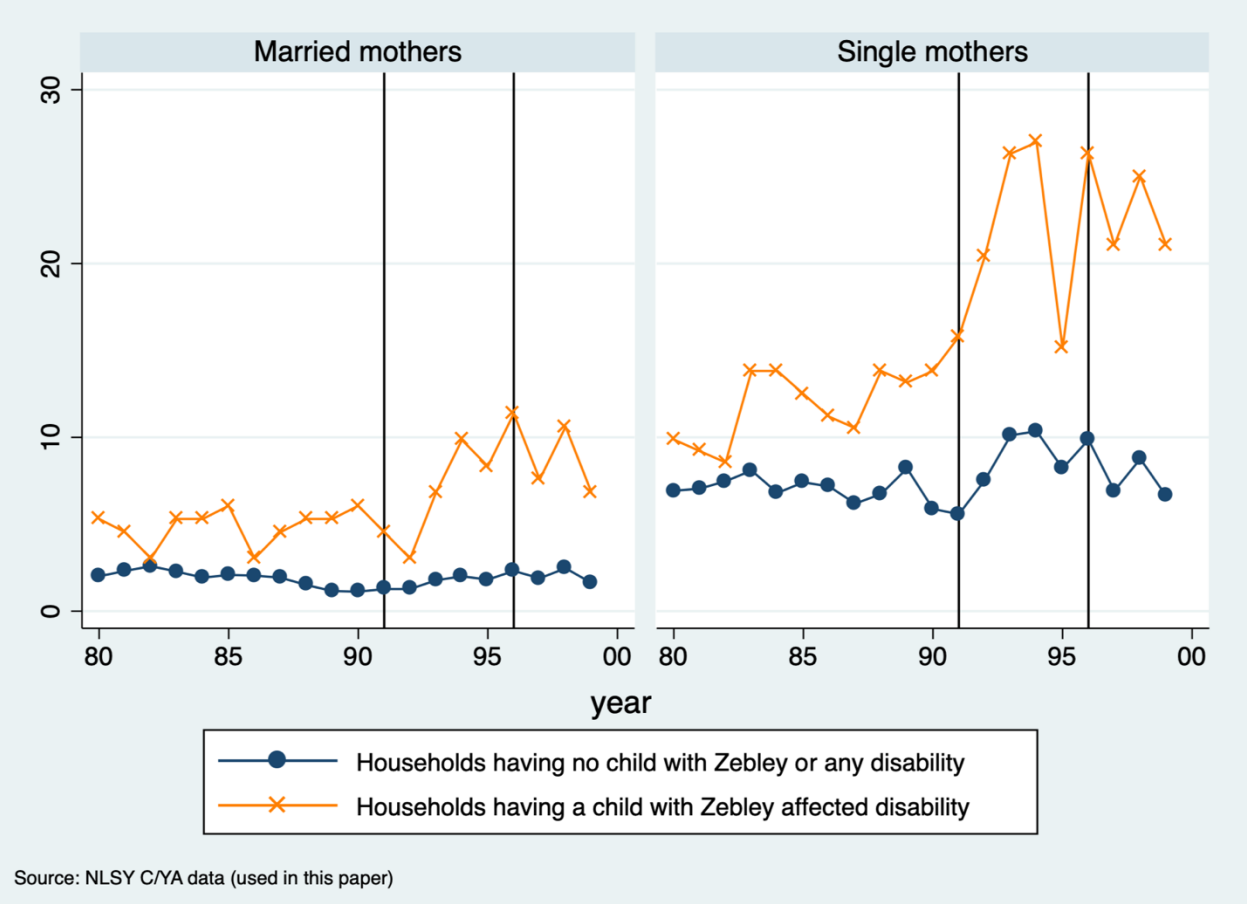
Figure 5 Percentage of households receiving SSI by whether the household was Zebley affected



Notes: The figure is showing the percentage of households receiving SSI in a given year from the years 1978 to 1999 grouping households by whether the household had a child having a Zebley disability. There are two groups of households represented in this diagram with separate lines: households having a child with Zebley affected disability and households not having any child with any type of disability. Post- 1991 there was a sharp increase in the proportion receiving SSI for households with Zebley affected disability. For households not having any kind of disability, we see no increase in the proportion receiving SSI and the line remains constant throughout the period.

In figure 6 considers SSI received by Zebley and non-Zebley affected households separately by mother's marital status at the time of Zebley reform. While the trends for the Zebley disorder group prior to 1991 were similar for both single and married mothers, post-1991 there was a sharp increase in the proportion of households receiving SSI for the Zebley-eligible group of single mother households, while there was no such increase for the other groups. Prior to 1991, the trends of the Zebley and non-Zebley-affected group were similar for single and married mothers.

Figure 6 Percentage of households receiving SSI: by mother's marital status and whether the household was affected by Zebley reform



Notes: The figure is showing the percentage of households receiving SSI in a given year from the years 1978 to 1999 grouping households by whether the household had a child having a Zebley disability and mother's marital status. There are two groups of households represented in this diagram with separate lines: households having a child with Zebley affected disability and households not having any child with any type of disability, and the two graphs are plotted side-by-side by married mothers and single mothers. Post-1991 there was a sharp increase in the proportion receiving SSI for households with Zebley-affected disability and single mothers. For single mothers having no child with a disability although an upward trend is seen post-1991, it is less steep. For households having a child with a Zebley disability and having a married mother, although there is an increase in the proportion receiving SSI post-1992, the increase is not as large in magnitude as for single mothers. For households not having any child with any kind of disability and having married mothers, we see no increase in the proportion receiving SSI and the line remains constant throughout the period.

Table 1 shows the mean values of household and children (and those children's parent) characteristics and outcomes. Only 5.8% of households had a child with Zebley disability.

Table 1: Descriptive statistics

Variable	Mean	Std.Dev.	Min	Max
Zebley disability	.058	.233	0	1
Non-Zebley disability	.054	.225	0	1
Family Income	31691.76	25473.9	4	147000
Cog Stimulation	1020.362	130.188	409	1300
Black/Hispanic	.431	.495	0	1
Zebley award	.064	.244	0	1
Num yrs 91-96	.251	.89	0	5
Single	.396	.489	0	1
Parental education	12.628	2.221	0	20
HH size	3.604	1.569	1	15
Age 1992	9.7186	3.0956	5	17
PIAT pc	46.306	25.433	0	99
High school graduation	.51	.5	0	1
College graduation	.209	.406	0	1
Income as adults	25439.2	23491.57	0	250000
Zero income as adults	.142	.309	0	1
Grade B/above	.853	.354	0	1
Hrs wrk/week as adult	65.52	33.2	1	300
On welfare as adults	.058	.233	0	1
Health coverage as adults	.783	.412	0	1
Own house as adults	.295	.456	0	1
Drug abuse as adults	.16	.367	0	1

Note: 'Zebley disability' refers to having an intellectual disability likely to be affected by Zebley reform. Here it is the proportion of households having at least one child with Zebley disorder. 'Non-Zebley disability' refers to disabilities not affected by Zebley reform. Here it is the proportion of households having at least one child with disability not affected by Zebley.

7 Empirical Strategy

Ideally, I want to estimate the long-term effects of households receiving SSI for an increased number of years on high school and college graduation, earnings as adults, and other later life outcomes of disabled children in the household to whom the award is directly targeted as well as these long-term outcomes on the siblings of those children to whom the award is not targeted, separately. Such an estimating equation could be given by the following:

$$y_i = \alpha + \beta * (Years\ Benefits_i) + \varepsilon_i \quad \text{(E8)}$$

However, the coefficient β in this equation is likely to suffer from various sources of selection bias. For example, those applicants who receive SSI for a greater number of years are likely to have more severe disabilities, in which case the estimate would be biased downwards. In order for β to be unbiased, exogenous source of variation is needed in the number of years

households received SSI that is uncorrelated with other factors affecting outcomes directly. The Zebley reform provided such quasi-experimental variation, which increased the probability of receiving benefits for individuals with mental disorders.

As a result of the Zebley reform, the criteria for a child to be classified as disabled was loosened and set to be consistent with that of adults. Under the new system a new Individualized Functional Assessment was established where a child would be classified as disabled and receive Supplemental Security Income (SSI) if they could not perform age-appropriate activities due to a disability. Also, the mental impairment listing was broadened. Due to the Zebley reform, we would expect to see an exogenous shift in the probability of receiving SSI for those with intellectual disabilities (except mental retardation) such as learning disability, ADHD, Autism, hyperactivity, speech impairment, etc.

Using the Zebley decision criteria, I identify households who had children with "Zebley-affected disability." Throughout this paper I refer to those households who had children with disability likely to be affected by Zebley in terms of receiving SSI as "Zebley-affected households," and those conditions as "Zebley-affected disabilities." If the mother in the household reported any child to be having learning disability, brain dysfunction, hyperactivity, speech impairment, emotional disturbance, seeing psychiatrist for emotional problem, taking medicines to control behavior, or felt any child needs help to control behavior then I classify the household as "treated." I take the disability status just prior to the announcement of the Zebley reform to avoid the manipulation of the treatment variable biasing my results. After the announcement of the reform households had more incentive to have a Zebley disability diagnosis for the children, which would cause a problem of selection bias. Hence, taking the pre-reform disability diagnosis as a time-invariant treatment variable avoids the problem of selection bias induced by the reform.

I employ a strategy that is inspired by difference-in-differences. Difference-in-differences has become one of the most popular methods used in identifying causal effects of policy interventions. Researchers have increasingly used extensions of the traditional difference-in-difference to estimate causal effects exploiting variation in treatment intensity (Claire and Cook 2015; Callaway and Anna 2019). A survey conducted by Chaisemartin and D'Haultfoeuille (2020) found that 20 percent of all empirical articles published by the American Economic

Review between 2020 and 2012 have used some form of difference-in-differences method to estimate the effect of policy intervention.

I use the age of the Zebley-affected child at 1992 as exposure to Zebley reform and implement a strategy inspired by the difference-in-differences model. Previous papers by Coe et al. (2013) and Levere (2017) both use similar methods to look into the effect of Zebley reform on children's outcomes. Conditional on being between ages five and 17 children, who were younger at 1992 (at the time of the reform) were eligible for Zebley for a greater period since upon turning 18 they are no longer eligible for child SSI. I only take children between ages five and 17 since mild intellectual disabilities are often not diagnosed in children before they turn five. I explore the Zebley reform using the fact that it affected the probability of receiving SSI for children with certain types of intellectual disabilities and those children who were younger benefitted from Zebley for a greater number of years.

In order to see the first-order effect of the Zebley reform I use the following specification:

$$\text{Years SSI received till } 18_i = \alpha_0 + \alpha_1(\text{Treated}_i) + \alpha_2(18 - \text{Age1992}_i) + \alpha_3(\text{Treated}_i)(18 - \text{Age1992}_i) + \alpha_4(X_{ij}) + \varepsilon_i \quad \text{(E9)}$$

Using this equation, I look into the first-order effect of being eligible for SSI due to the Zebley reform on the number of years SSI is received until the child turned 18 as well as the amount of SSI the household received until the child turned 18. Treated_i is a dummy indicating the household has a Zebley affected child, $18 - \text{Age1992}_i$ refers to 18 less the age of the child in 1992, and X_{ij} refers to household covariates like mother's education, race, and marital status.

For the children directly exposed to the reform due to having the intellectual disability themselves, I employ the following specification to obtain the reduced form effects:

$$Y_i = \beta_0 + \beta_1(\text{Treated}_i) + \beta_2(18 - \text{Age1992}_i) + \beta_3(\text{Treated}_i)(18 - \text{Age1992}_i) + \beta_4(X_i) + \varepsilon_i \quad \text{(E10)}$$

Here Y_i refers to outcomes such as years of schooling completed, college graduation by age 25, high school graduation by 19, enrollment in college by 20, earnings at ages 25 and 30, and other adult life outcomes being on public assistance and having health insurance coverage as at ages 25 and 30. Here β_3 gives the intent to treat estimates of being exposed to the reform for an additional year on long-run outcomes.

In order to obtain the reduced form spillover effects on the other siblings in the family (those children who did not have a disability themselves so not directly impacted to the reform), I employ the same specification as (E10) except for outcomes of siblings as the dependent variable. The standard errors for the reduced form estimates are clustered at the household level. In alternative specifications in the robustness check section, I estimate (E9) and (E10) with separate dummies for each age between five and 17 and estimate the intent to treat estimates for each cohort.

The identification assumption needed for my estimates to be causal is that in the absence of the Zebley reform the gap between children having intellectual disabilities and children not having intellectual disabilities would not have varied systematically by the child's age in 1992. It is unlikely to be the case that my identification assumption is violated, however in the section10 I will discuss any potential source of violation to my identification assumption. Finally, my data and methodology only allow me to identify the intensive margin effects of being eligible for Zebley for an additional year and not the extensive marginal effects.

8 Results

In this section, I first show the first-order impact of exposure to the Zebley reform for an additional year in terms of the number of years Supplemental Security Income (SSI) received and the amount of SSI received till the child (having Zebley-impacted disability) turned 18. Then I show the effect of being exposed to the Zebley reform for an additional year on education and earning outcomes of the Zebley-impacted children themselves and on their siblings.

8.1 First-order results

Table 2 shows the first-order results of being exposed to the Zebley reform for an additional year on the number of years SSI received till the Zebley eligible child turned 18 and the amount of SSI received till the Zebley impacted child turn 18. The results show that being eligible to receive SSI for an additional year (due to being younger at the time of the reform and having a Zebley-eligible disability) increases the number of years SSI received by 0.14 years and the amount of SSI received by $734. This effect is statistically significant at 1 percent. I control for

the fixed effect of having a Zebley-impacted disability and also the age at 1992, parental education, mother's marital status and race.

Table 2 : First order results

	Years SSI received till 18	Amount of SSI received till 18
Zebley disability	0.1986	-590.6617
	(0.3353)	(1570.7834)
18_less_age_92	-0.0051	19.3984
	(0.0124)	(58.0434)
Zebley disability*18_ less_age_92	0.1351***	734.2952***
	(0.0390)	(181.2952)
Cons	2.2202***	6877.8430***
	(0.2333)	(1080.7310)
Obs.	3398	3267
Dependent variable mean	.9135	2855.974
Dependent variable std.deviation	2.2561	9863.586

Controls included for parental education, mother's marital status and race
Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

8.2 Outcomes of Zebley affected children

Table 3 presents the effect of being exposed to Zebley for an additional year on the educational outcomes of the children having Zebley-affected disabilities. I control for the difference between children with Zebley-affected disabilities and no disabilities, with a dummy for being a treated household. I include controls for gender of the child, race, mother's marital status, and education and the age of the child in 1992. I find that being eligible for Zebley for an additional year increases the number of years of schooling completed by 0.4 years and this effect is statistically significant. However, it also reduces the probability that the child completes college by the age of 25 by 0.8 percent. It has no statistically significant effect on high school completed by the age of 19 and being enrolled in college by the age of 20, and the point estimates are very close to zero.

Table 3: Education outcomes: Effect on the Zebley eligible children

	Yrs of schooling completed	College completion by 25	High school completion by 19	Enrolled in college by 20
18_less_age_92	0.0104	0.0049***	0.0057***	0.0097***
	(0.0244)	(0.0012)	(0.0021)	(0.0018)
Zebley disability	-2.1979*	0.0375	0.0590	-0.0685
	(1.1653)	(0.0391)	(0.0738)	(0.0421)
Zebley disability*18_less_age_92	0.3865*	-0.0088*	0.0013	0.0055
	(0.2210)	(0.0048)	(0.0095)	(0.0059)
Cons	10.4697***	-0.1551***	-0.0671	-0.2836***
	(0.6684)	(0.0325)	(0.0459)	(0.0413)
Obs.	4256	5660	5660	5660
Dependent variable mean	13.7844	.0908	.3575	.1876
Dependent variable std.deviation	5.0394	.2873	.4793	.3904

Controls included for household and child-level covariates
Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1*

Table 4 considers the effect of being exposed to Zebley reform for an additional year on the adult life incomes at ages 25 and 30, being covered by private health insurance at ages 25 and 30, and being on public assistance (AFDC/SSI) at ages 25 and 30. The results show that being exposed to Zebley reform for an additional year due to being younger at the time of the reform does not have a statistically significant effect on log income at ages 25 and 30, and having private health insurance at the ages 25 and 30. This is in line with Coe et al. (2013), who found that children entering SSI during the Zebley period with Zebley-affected conditions have no difference in educational outcomes or earnings as adults compared to children entering SSI during other periods or having different non-Zebley-affected disorders.

However, Table 4 shows that being affected by Zebley for an additional year due to being younger in 1992 increases the probability of being on welfare at age 25 by 1.8 percent and this effect is statistically significant. It also increases the probability of being on welfare at age 30 by a similar magnitude of 1.6 percent. This is in contrast with Coe et al. (2013), who found that children with Zebley-affected disorder entering SSI during Zebley had a lower probability of being on welfare as adults compared to children entering SSI at a different period or having non-Zebley-affected disability. The discrepancy arises because the parameter being estimated by Coe et al. (2013) differs from the estimates of this paper. Whereas in this paper I estimate the effect

of being affected by to the Zebley reform for an additional year, the parameters of Coe et al. (2013) provide estimates of entering SSI during Zebley as opposed to entering SSI during another period.

Table 4: Income, insurance and welfare: Effect on the Zebley-affected children

	Log income at 25	Log income at 30	Private health insurance at 25	Private health insurance at 30	Welfare at 25	Welfare at 30
18_less_age_92	0.0046	0.0034	-0.0024	-0.0024	-0.0012	-0.0030
	(0.0059)	(0.0082)	(0.0021)	(0.0024)	(0.0015)	(0.0020)
Zebley disability	-0.5179**	-0.4026	0.0434	0.0791	-0.0536	-0.0380
	(0.2014)	(0.3108)	(0.0702)	(0.0793)	(0.0522)	(0.0621)
Zebley disability*18_ less_age_92	0.0312	-0.0202	0.0032	-0.0050	0.0176**	0.0157
	(0.0255)	(0.0450)	(0.0090)	(0.0102)	(0.0075)	(0.0100)
Cons	9.1268***	8.8244***	-0.0215	-0.0191	0.1694***	0.2022***
	(0.1354)	(0.1901)	(0.0440)	(0.0469)	(0.0310)	(0.0473)
Obs.	3328	1669	5660	5121	3608	1947
Dependent variable mean	9.6636	9.6465	.3613	.3363	.0817	.0722
Dependent variable std.deviation	1.0419	1.1141	.4804	.4725	.2740	.2589

Controls included for household and child-level covariates
Standard errors are in parenthesis
*** *p<0.01, ** p<0.05, * p<0.1*

8.3 Spillover effects on the other siblings in the family

In Table 5 and 6, I present the effects of the Zebley reform on the later life outcomes of the siblings of the Zebley-affected children who did not have a disability themselves but were exposed to the reform due to living in the same household as the sibling having a Zebley-affected disability. In both Table 5 and 6, I include a dummy for being a treated household, age of the Zebley-afffected child in the household at 1992, age of the sibling being considered, their gender, their race, and their mother's education and marital status. Also, the standard errors are clustered at the household level. The exposure to the Zebley reform is given by whether the household was in the 'treated' group (if a child in the household had a disability likely to be affected by Zebley) and the Zebley-affected child being is than 18 at 1992 (and by how many years younger).

Table 5 shows the effect of being affected by to the Zebley reform for an additional year on the educational outcomes of the siblings who did not have disability themselves, but through living in the same household as sibling having Zebley-affected disability. It is clear that exposure to Zebley for an additional year has no impact on years of schooling completed, college

completion by age 25, and college enrollment by age 20. However, there is a statistically significant impact on the probability of completing high school by the age of 19. Household being eligible for SSI for an additional year increases the probability of high school completion by age 19 by 1.9 percent.

Table 5: Education outcomes: Spillover effect on the other siblings in the family

	Highest grade completed	College completion by 25	High school completion by 19	Enrolled in college by 20
18_less_age_92	0.0064	0.0077***	0.0050***	0.0096***
	(0.0151)	(0.0010)	(0.0016)	(0.0013)
Zebley disability	-0.8058**	-0.0315	-0.0856	-0.0603
	(0.3158)	(0.0313)	(0.0604)	(0.0440)
Zebley disability*18_less_age_92	0.0436	0.0021	0.0189**	0.0084
	(0.0428)	(0.0045)	(0.0085)	(0.0061)
Cons	10.2003***	-0.2134***	-0.0751*	-0.3051***
	(0.4085)	(0.0302)	(0.0418)	(0.0371)
Obs.	5121	6845	6737	6804
Dependent variable mean	13.778	.1094	.3717	.2047
Dependent variable std.deviation	4.2744	.3122	.4833	.4035

Controls included for household and child-level covariates
Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1*

Table 6 shows the effect of the household being afffected by the Zebley reform for an additional year on the income, private health coverage, and welfare recipiency status as adults of the siblings with no disability in the household. Households exposed to the Zebley reform for an additional year increases income earned at age 25 by 4 percent and increases the probability of being covered by private health insurance at 25 by 2.2 percent for non-disabled siblings in the family. Both these effects are statistically significant. Effects on none of the other outcomes, such as log of income at age 30, private health insurance coverage at age 30, and being on welfare at ages 25 and 30 are statistically significant.

Table 6: Income, insurance and welfare: Effect on the other siblings in the family

	Log income at 25	Log income at 30	Private health insurance at 25	Private health insurance at 30	Welfare at 25	Welfare at 30
18_less_age_92	0.0122***	0.0009	0.0036**	-0.0021	-0.0027**	-0.0033*
	(0.0045)	(0.0073)	(0.0016)	(0.0022)	(0.0011)	(0.0019)
Zebley disability	-0.4439***	-0.2809	-0.1188**	-0.0462	0.0402	0.1407*
	(0.1521)	(0.2130)	(0.0519)	(0.0590)	(0.0575)	(0.0776)
Zebley disability*	0.0404**	0.0074	0.0217***	0.0093	-0.0008	-0.0154
18_less_age_92	(0.0184)	(0.0298)	(0.0068)	(0.0079)	(0.0072)	(0.0095)
Cons	9.0561***	8.9376***	-0.0444	-0.0143	0.1764***	0.2121***
	(0.1234)	(0.1769)	(0.0397)	(0.0456)	(0.0257)	(0.0457)
Obs.	4009	1695	6844	5195	4314	1977
Dependent variable mean	9.7098	9.6678	.3739	.3337	.0729	.0746
Dependent variable std.deviation	1.0354	1.1060	.4839	.4716	.2600	.2627

Controls included for household and child-level covariates
Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

9 Discussion

Overall, the results highlight the positive aspects of providing child Supplemental Security Income (SSI) benefits to children with less severe intellectual disabilities on not only the Zebley-affected children to whom the benefits are directly targeted, but also on the other siblings in the family. Being eligible to receive SSI for a longer period of time increases years of schooling completed by the Zebley-affected child and has spillover effects on the other siblings as they have a higher probability of completing college by age 19, higher incomes at age 25, and higher probability of being covered by private health insurance at 25. These effects are long-term so it shows how important early childhood financial intervention can be.

However, there are some negative effects as well. In the results we see that it increases the probability that the Zebley-affected children are on welfare as adults and these children have a lower likelihood of completing college by age 25 (although the total number of years of schooling increases). Given that the average years of schooling completed in the estimation sample is 12 years of school (1.8 additional years of schooling), the finding that being exposed to Zebley for an additional year increases years of schooling by 0.4 years is an effect of noteworthy magnitude. The negative effect of Zebley reform exposure for an additional year lowers their probability of finishing college by age 25 by 0.08 percentage points is a much smaller in impact magnitude since the mean college graduation rate in my estimation sample is 9.1 percent. The

findings indicate that although receiving financial assistance makes them less incentivized to finish college by age 25, the effect is of a small magnitude.

Referring to the model in section 5, it can be seen that the negative effect on parental investments through the channel of "disability labelling effect" is not strong enough, as the reduced form estimates show number of years of schooling increases for the Zebley-affected children. Also, there seems to be externalities of investment between siblings as both groups of siblings (Zebley-affected and non-disabled siblings) in the family tend to benefit from being exposed to the reform. The results suggest that positive effects from increased financial resource and sibling human capital tend to overshadow the negative effect of disability labelling.

However, the effects discussed here impact only the group of children impacted by Zebley, so children having a very specific set of disabilities that were affected by the Zebley reform rather than a broader group of disabled children. Hence, the results here in terms of the disability labelling effect might not universally be applicable.

10 Robustness checks

`For my identification strategy to be valid I must assume the difference in outcomes between those with Zebley-affected disabilities and no disabilities would not have systematically varied by their age in 1992 in the absence of the Zebley reform. If this assumption is true, then my identification strategy is valid such that any differential trends in outcome variables by their age at 1992 and Zebley disability status can be attributed to differential exposure to Zebley reform.

The parallel trends assumption is usually empirically tested by trajectories of outcomes by age at 1992 and Zebley disability group before the Zebley reform. However, there are no earning or educational trajectories before the Zebley decision since everyone was a child at that time. To perform an indirect test of parallel trends assumption, I compare the parental labor market outcomes just before Zebley reform to provide suggestive evidence that any changes in outcomes after the Zebley reform are not due to pre-existing differences in family earnings. These tests are in line with robustness tests performed in Coe et al. (2013) and Levere (2017). I also test whether the gap in the likelihood of scoring in the bottom 15 percentile in the Peabody Individual Achievement Test (PIAT) test just before reform between children with Zebley-affected disabilities and no disabilities is systematically related to their age in 1992. The PIAT

test measures a child's scholastic attainment, and the test is age-appropriate so if the gap in pre-Zebley test scores between children with Zebley-affected disabilities and no disabilities does not vary systematically by the child's age in 1992 it lends credibility to my identification assumption as it shows that my results are not driven by pre-existing scholastic differences in children. I perform the same test with the pre-Zebley reform household cognitive stimulation scores. The National Longitudinal Survey of Children and Young Adults 1979 (NLSY 79 C/YA) supplement asks mothers a series of questions regarding the environment of the household and assigns a score to the household with regards to how stimulating the environment of the household is for the development of children's cognitive ability. If the pre-Zebley reform households' cognitive stimulation score gap does not systematically vary between households with Zebley-affected children and households with no disabled children by the age of the child in 1992, it shows that any changes in outcomes due to the Zebley exposure are not driven by pre-existing household's environmental factors. Table 1A in the Appendix shows the results of these tests. The results lend credibility to my identification assumption as the pre-Zebley household income, household cognitive stimulation score, and child's PIAT test scores do not differ by household being Zebley-eligible and the Zebley child's age at 1992.

The primary threat to my identification strategy is a differential trend that only affects Zebley-affected children of a certain age. For example, it might be the case that over time employers have become more open to hiring people with disabilities — if true, younger children with a disability would have an increased chance of getting hired compared to Zebley-affected children of older ages. This would lead me to spuriously attribute increases in employment to a longer period of being eligible for child Supplemental Security Income (SSI). One such threat to identification might be the Americans with Disabilities Act (ADA) which was passed in 1990. However, it is unlikely to pose a credible threat to my identification assumption because it was already passed by the time of the reform hence unlikely to affect the gap between children with Zebley-affected disability and no disability by the child's age at 1992.

To provide some additional evidence that differential trends are not driven by ADA, I run the first order and reduced-form specifications, and instead of using children with Zebley-affected disabilities as the "treated" group, I use children with physical disabilities as the treated group. This serves as a dummy test in the sense that if results are driven by ADA, I would expect to see similar intent to treat effects on children with physical disabilities as well. Table 2A shows

that when the treated group is households having a child with a physical disability (instead of household having a child with Zebley-affected disability), there is no first-order effect on the amount of SSI or years SSI received until eighteen due to having a physical disability by child's age at 1992. Also, in terms of educational outcomes shown in Table 3A, we see no significant effects of having a physical disability by the child's age at 1992 on the educational outcomes of the child. In Table 4A we see that in terms of income, welfare, and health insurance the effects of having a physical disability by the child's age at 1992 are in the opposite direction for log income at 30 and health insurance at 30 than we see for Zebley-affected children and the effects we see on Zebley children are not present here. Hence the dummy test of running the first order and reduced-form specifications on a group with a disability not exposed to the reform and finding there are no first-order effects or reduced form effects on that group lends further credibility to my identification assumption. ADA is highly unlikely to be driving the results because otherwise, we would see the same results on the group with physical disabilities as well.

Additionally, I also run my first-order and reduced-form specifications by including dummies for each age group from five to 17 and interacting it with Zebley disability-affected instead of using age at 1992 as a continuous variable. If age at 1992 is indeed driving the results, I would see the magnitude of marginal effects of Zebley-affected disability is decreasing with age. The results support my identification assumption. Figure 1A to 6A in the Appendix shows the marginal effect of a Zebley disability at various ages. It can be seen that the marginal effect of Zebley disability on years of SSI received and the amount of SSI received decreases with age. The results of Table 3 (located in Section 8) show that the highest grade completed increases due to an additional year of Zebley exposure. When I look at Figure 3A, I find that the marginal effect of Zebley-affected disability on the highest grade completed decreases systematically by age in line with my identification assumption. In Table 3, we can also see that an additional year of exposure to the Zebley reform reduces the probability of college graduation by 25 years of age. In Figure 4A, where I look into the marginal effects of Zebley-affected disability on college completion by 25, I find that the lower the age in 1992 the higher the marginal effect of Zebley disability in lowering the probability of college graduation. In my baseline results in Table 4, I find that an additional year of Zebley reform exposure increases the likelihood of being on welfare at 25. Figure 5A lends credibility to the results as it shows that the marginal effect of Zebley-afffected disability in increasing likelihood of being of welfare decreases with age of the

child at 1992. In Table 3, I find that an additional year of Zebley reform exposure has no significant impact on high school graduation by age 19 of the Zebley impacted child. Figure 6A further corroborates this finding as the marginal effect of Zebley-affected disability on high school graduation by age 19 is constant at all ages. Looking into the first-order and reduced form results by including dummies for each age provides support for the identification assumption as I see the magnitude of marginal effects of the Zebley reform decreases systematically with child's age at 1992.

There might be an additional concern that since I am looking at later life outcomes such as income, and other dependent variables at a particular year, it might be affected by the condition of the economy. However, since I use only cross-sectional variation across individuals if the condition of the economy affected individuals' earnings and other outcomes in that year, we would expect it to apply to all treatment and control groups equally thereby not posing a threat to my identification strategy.

11 Conclusion

The Zebley reform expanded access to the Supplemental Security Income (SSI) program for children with certain kinds of intellectual disabilities. There was a dramatic increase in program costs due to the reform and this paper attempts to look into the long-term effects of the Zebley reform on both the children with Zebley affected disabilities and their siblings with no disabilities.

Overall, being eligible to receive SSI for an additional year due to the Zebley reform largely has a beneficial impact on the long-term outcomes of the children to whom SSI was targeted as well as the other siblings in the family. Being exposed to receiving SSI for an additional year increases the years of schooling completed by 0.4 years by the Zebley-eligible children, which is noteworthy given on average individuals completed 1.4 years of schooling after completion of twelfth grade. For the siblings in the household without a disability, the household being eligible for SSI for an additional year increases the probability of high school completion by age 19 by 1.9 percentage points, increases the probability of being covered by private health insurance at 25 by 2.2 percentage points, and increases income earned at age 25 by

4 percentage points. Not only are these effects statistically significant but of sizeable magnitude given the average values of these variables in the estimation sample.

The effects obtained in this paper are the effects of receiving SSI on the children (and their siblings) who started receiving SSI due to the Zebley reform. The Zebley reform targeted children with intellectual disabilities (except mental retardation) and the effects of receiving SSI on this subgroup are likely to be of interest to policymakers since these children's later life outcomes might be potentially improved by early childhood interventions. Hence future work can look into the effect of receiving welfare in early childhood on another subgroup of interest exploiting other reforms that have taken place.

Although I looked into the effect of being exposed to Zebley reform for an additional year, the channel through which Zebley reform impacted the children might not only be through financial assistance. Receiving SSI almost always automatically makes one eligible for Medicaid, which can lead to better health (Finkelstein et al. 2012) in childhood which might carry into adulthood as well. Individuals might be more encouraged to seek health insurance coverage as adults once they are aware of the benefits of being covered by health insurance programs. I find an increased likelihood of being covered by private health insurance for the siblings in the family whose eligibility for SSI was not impacted. This might happen through them observing and learning about the importance of being covered by health insurance. Also, parents have the ability to spend more on the siblings in the family when additional income in the form of SSI is added to family's budget.

Finally, SSI recipients might have a harder time transitioning into the labor market (Levere 2017). This suggests that targeting more financial resources to children with mild disabilities in early childhood with programs of SSI already in place to help transition these children into the labor market (Livermore et al. 2020; Anderson et al. 2021; Sevak and Steven 2018; Cohen 2007) would be an effective way of helping children with disabilities as they transition into the labor market.

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Appendix

Table 1A: Family income, PIAT score and household cognitive stimulation scores: Relationship with Zebley

reform

	Family income in 1990	PIAT score in bottom 15 percentile in 1990	Household cognitive stimulation score 1990
Zebley disability	2420.3031	0.0636	-7.1225
	(2849.4277)	(0.0755)	(20.8725)
18_less_age_92	-90.1254	-0.0128***	-1.1308
	(134.9580)	(0.0035)	(0.9218)
Zebley disability*	-96.8065	-0.0031	-1.7515
18_less_age_92	(342.6517)	(0.0087)	(2.6536)
Cons	937.5496	0.5338***	777.9934***
	(2678.7703)	(0.0655)	(17.0831)
Obs.	2378	1869	2736
R-squared	0.2969	0.0440	0.1928

Controls included for household and child-level covariates
Standard errors are in parenthesis
*** *p<0.01, ** p<0.05, * p<0.1*

Table 2A: Test of whether having Physical disability and the age of 1992 has an effect on Years and Amount of SSI received till 18

	Years SSI received till 18	Amount of SSI received till 18
Physical disability	-0.1023	721.4217
	(0.3914)	(1800.6974)
18_less_age_92	0.0057	87.1800**
	(0.0066)	(42.9661)
Zebley disability*18_less_age_92	0.0423	55.3248
	(0.0354)	(165.4351)
Cons	2.3334***	7475.9244***
	(0.1987)	(1037.3786)
Obs.	4367	3454
R-squared	0.1109	0.0741

Controls included for parental education, mother's marital status and race
Standard errors are in parenthesis
*** *p<0.01, ** p<0.05, * p<0.1*

Table 3A: Education outcomes: Test of whether physical disability and age at 92 has any effect on outcomes

	Highest grade completed	College completion by 25	High school completion by 19	Enrolled in college

				by 20
18_less_age_92	0.0096	0.0052***	0.0065**	0.0084***
	(0.0219)	(0.0015)	(0.0028)	(0.0021)
Physical disability	-1.3069	0.0081	0.2271**	0.0432
	(1.4256)	(0.0428)	(0.1116)	(0.0836)
Physical disability*18_less_age_92	0.1846	-0.0038	-0.0142	-0.0048
	(0.1819)	(0.0052)	(0.0121)	(0.0094)
Cons	10.2543***	-0.1593***	-0.0464	-0.2647***
	(0.4868)	(0.0340)	(0.0509)	(0.0432)
Obs.	4104	5462	5536	5582
R-squared	0.0354	0.0450	0.0725	0.0671

Controls included for household and child-level covariates
Standard errors are in parenthesis
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 4A: Income, insurance and welfare: Test of whether physical disability and age at 92 has any effect on outcomes

	Log income at 25	Log income at 30	Private health insurance at 25	Private health insurance at 30	Welfare at 25	Welfare at 30
18_less_age_92	0.0080	-0.0166	0.0038	-0.0014	-0.0034*	-0.0012
	(0.0076)	(0.0106)	(0.0027)	(0.0029)	(0.0021)	(0.0026)
Physical disability	-0.0753	0.3018	0.2890***	0.3166***	-0.0221	0.0485
	(0.2958)	(0.3266)	(0.1072)	(0.1073)	(0.0637)	(0.0923)
Physical disability*	-0.0110	-0.0879*	-0.0178	-0.0283**	0.0094	-0.0046
18_less_age_92	(0.0307)	(0.0514)	(0.0117)	(0.0127)	(0.0072)	(0.0106)
Cons	9.0799***	8.9855***	-0.0433	-0.0231	0.1939***	0.1969***
	(0.1432)	(0.1932)	(0.0466)	(0.0513)	(0.0331)	(0.0553)
Obs.	3085	1417	5461	4465	3334	1648
R-squared	0.0855	0.0700	0.0583	0.0507	0.0416	0.0330

Controls included for household and child-level covariates
Standard errors are in parenthesis
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

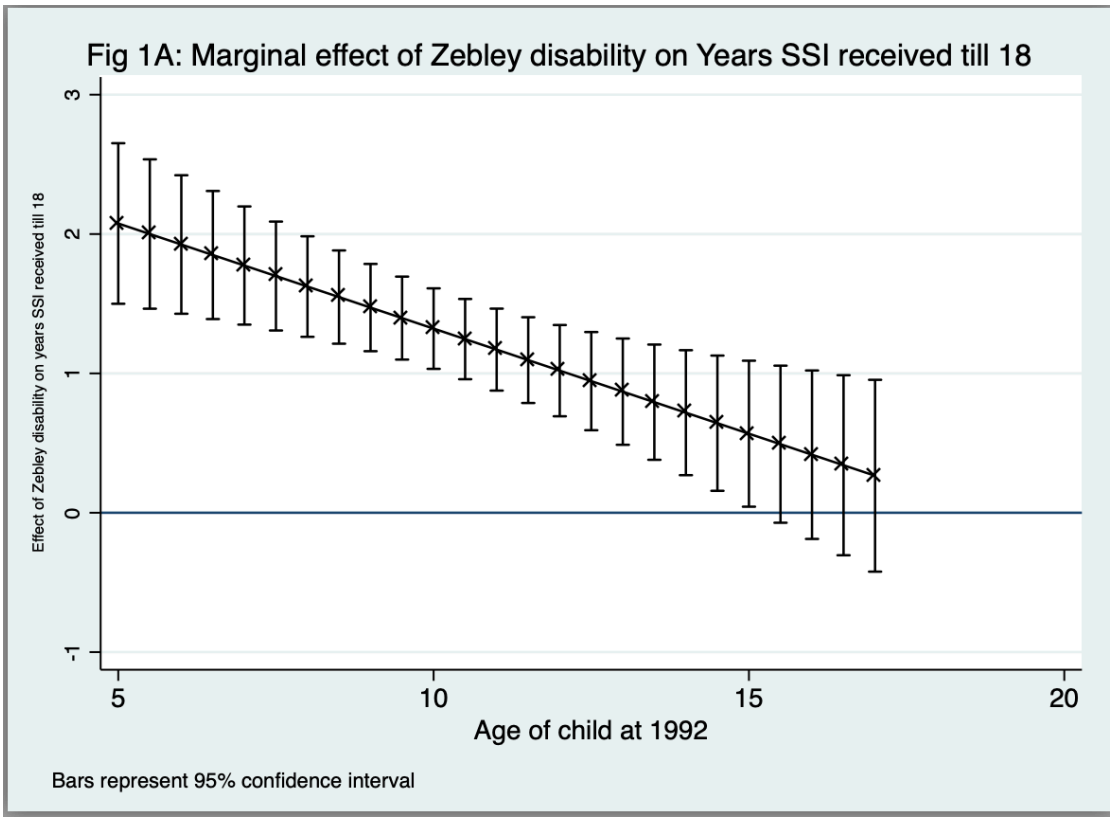
Fig 1A: Marginal effect of Zebley disability on Years SSI received till 18
Effect of Zebley disability on years SSI received till 18
-1
0
1
2
3
5
10
15
20
Age of child at 1992
Bars represent 95% confidence interval

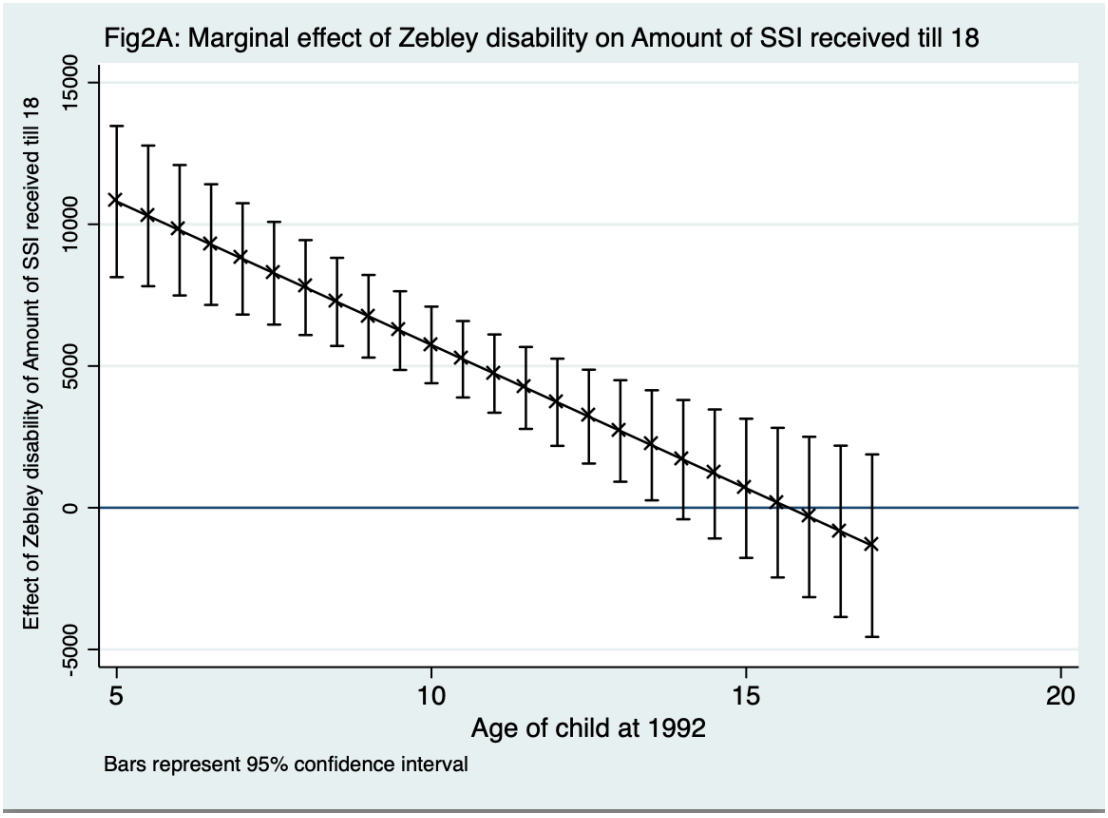
Fig2A: Marginal effect of Zebley disability on Amount of SSI received till 18
Effect of Zebley disability of Amount of SSI received till 18
-5000
0
5000
10000
15000
5
10
15
20
Age of child at 1992
Bars represent 95% confidence interval


Figure 3A: Marginal Effect of Zebley disability on highest grade completed by Zebley children
Effect of Zebley disability on highest grade completed
-4
-2
0
2
4
6
5
10
15
20
Age of child at 1992
Bars represent 95% confidence interval

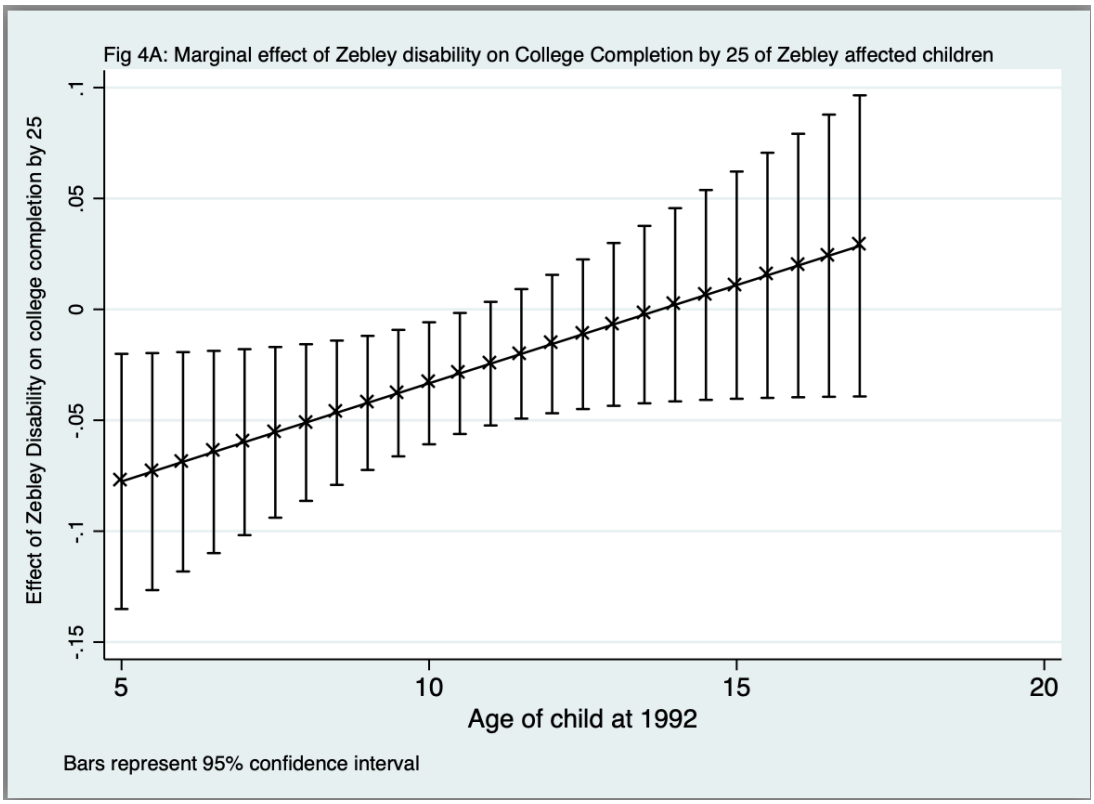
Fig 4A: Marginal effect of Zebley disability on College Completion by 25 of Zebley affected children
Effect of Zebley Disability on college completion by 25
-.15
-.1
-.05
0
.05
.1
5
10
15
20
Age of child at 1992
Bars represent 95% confidence interval

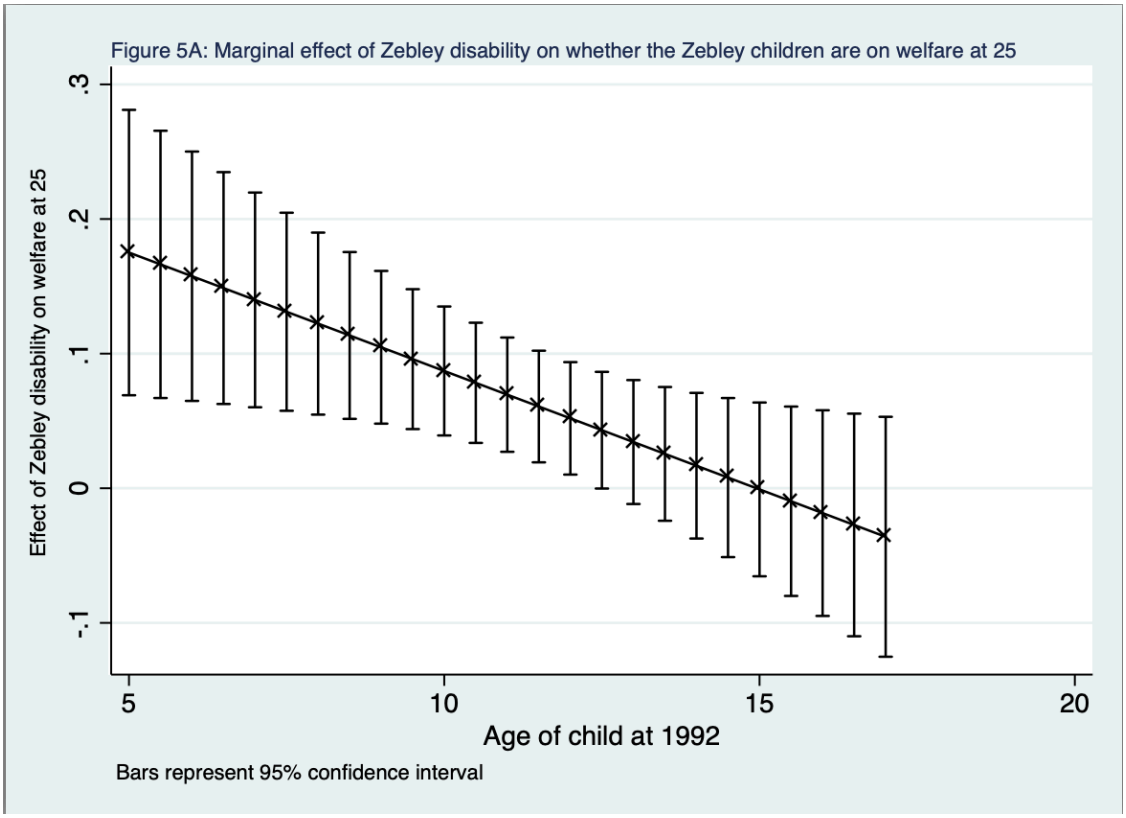
Figure 5A: Marginal effect of Zebley disability on whether the Zebley children are on welfare at 25
Effect of Zebley disability on welfare at 25
-.1
0
.1
.2
.3
5
10
15
20
Age of child at 1992
Bars represent 95% confidence interval

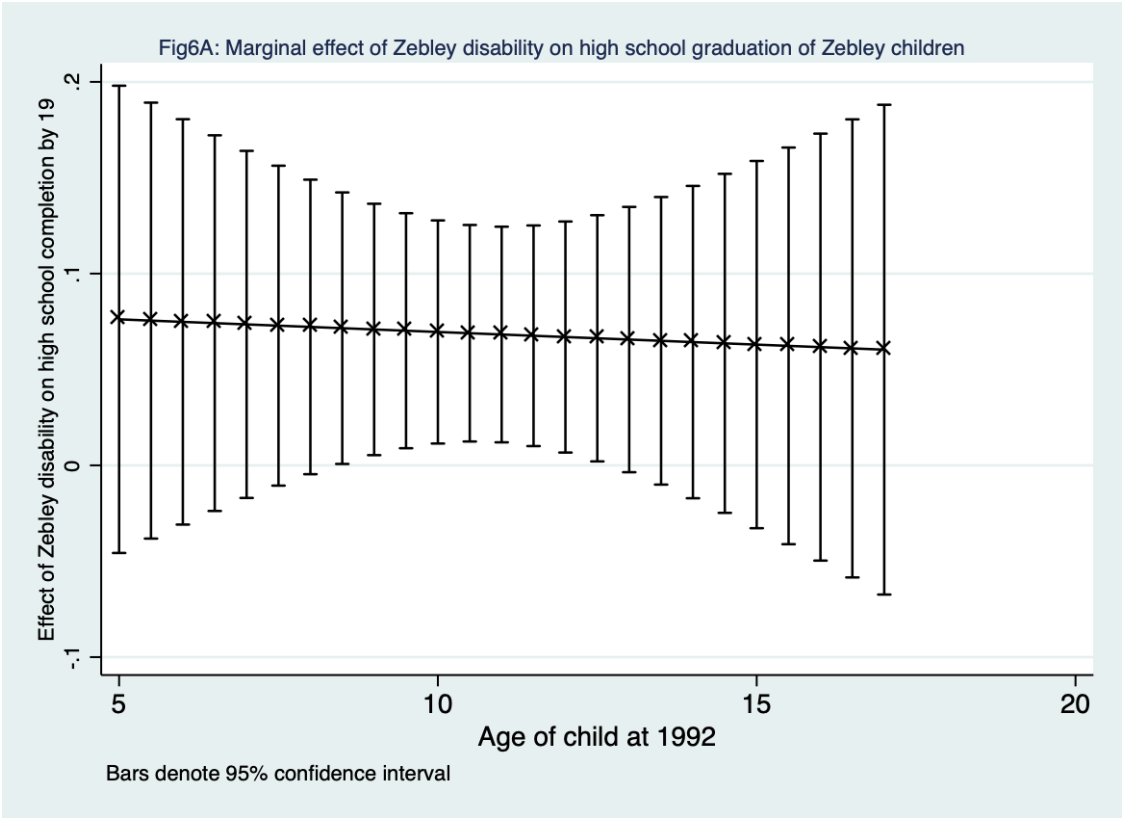
Fig6A: Marginal effect of Zebley disability on high school graduation of Zebley children
Effect of Zebley disability on high school completion by 19
-.1
0
.1
.2
5
10
15
20
Age of child at 1992
Bars denote 95% confidence interval

Center for Financial Security

School of Human Ecology
University of Wisconsin-Madison

1300 Linden Drive
Madison, WI 53706

608-890-0229
cfs@mailplus.wisc.edu
cfs.wisc.edu

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