Home Alone: Maternal Employment, Child Care and Adolescent Behavior

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As female participation in the labor force continues to grow in the US, so too does reliance on non-parental child care. However, the high cost of child care and inadequate supply in some areas has impeded the ability of working mothers to find sufficient child care for their children. As a result, roughly eight million children ages five to fourteen spent time without adult supervision on a regular basis in the US in 1998. I examine the consequences of inadequate adult supervision among school age children and the effect of government subsidized child care programs on the likelihood of adult supervision. Using ordinary least squares, fixed effect, and instrumental variables techniques on a panel of young adolescents, I find that: 1) children with adult supervision are significantly less likely to skip school, abuse alcohol or marijuana, steal something as well as hurt someone, and 2) federal and state subsidies of child care have a positive and significant impact on the probability of adult supervision, with the effects larger for those children most likely to engage in antisocial behavior. These findings suggest that increasing government subsidies for child care has positive spillover effects beyond the pre-school age children who are the primary target of such subsidies, with potentially important consequences for human capital development and labor market outcomes later in life.

Keywords: child care, youths, provision and effects of welfare programs
JEL Classifications: J13, I38

I. Introduction

The latter half of the 20th century witnessed a remarkable rise in female labor force participation and with it a large increase in the need for alternative child care. Estimates from the US Census Bureau indicate that 78 percent of women with school age children were in the labor force in 1999, up from 64 percent in 1980 and 33 percent in1950. For single women, the trend has recently escalated as a result of state welfare reform efforts that began in the early-mid 1990s and culminated in the federal Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996. Between 1994 and 1999, welfare caseloads dropped by 48 percent and coincident with this reduction, the proportion of unmarried female family heads with dependent children who participate in the labor force increased from 26 to 31 percent (Schoeni and Blank, 1999). As a result, the availability of child care subsidies for low-income mothers has become even more critical.

Due in large part to the high cost of child care and inadequate supply in some areas, many working mothers are unable to find sufficient child care for their children. An estimated eight million children ages five to fourteen spent time without adult supervision on a regular basis in the US in 1998, half of whom are thirteen and fourteen year olds (Miller, 1999). Left unsupervised, children may be more likely to engage in antisocial and potentially dangerous behavior. There is some evidence that suggests that children who care for themselves after school (referred to as latchkey children) are at greater risk of truancy from school, stress, receiving poor grades, risk-taking behavior and substance abuse (Dwyer et. al., 1990). Unintentional injury, which is the leading killer of

children in the US, is also directly related to the level of supervision. Lastly, the fact that juvenile crime rates triple between the hours of three and six in the evening and that children are most likely to be the victims of a violent crime committed by a non-family member during these same hours also suggest that supervision after school may be critical in promoting the health and well-being of adolescents (Fox and Neuman,1997; Office of Juvenile Justice and Delinquency Prevention, 1996).

To help address the child care dilemma faced by low-income mothers, both federal and state governments have developed programs that subsidize child care for low-income working mothers. The largest programs are those funded by the federal government some of which are based on matching state participation. They include the federally funded Head Start program begun in 1965, child care subsidies established in 1990 as part of the welfare system, the Child Care and Development Block Grant established in 1990 and the Child Care and Development Fund established in 1996.

The focus of the present research is two-fold. First, to estimate the impact of inadequate adult supervision on adolescent behavior including school delinquency, relatively minor criminal activity such as stealing something, alcohol and drug use, as well as the likelihood of physical harm. Second, to examine the relationship between adult supervision and the child care subsidies available through the above mentioned programs. As part of the latter analysis, I also examine whether impact of child care subsidies differs by certain family characteristics such as marital status. Previous work has found that women's responsiveness to labor market conditions and child care subsidies vary with respect to their marital status. In addition, the multiple child care subsidies analyzed in this paper are reportedly targeted to or used by different types of

families (e.g., those who rely on welfare and thus who do not). Thus we would expect the programs' effects on adolescent supervision to vary by family type as well.

Three factors distinguish this paper from previous research. First, the focus of this work is young adolescents -- an age group that has been largely unstudied in the child care literature. Though the child care subsidies are primarily intended for preschool age children, a significant portion of the funds are spent on care for school age children, and in addition, for adolescents in families with pre-school age siblings, there may be considerable spill-over effects. Second, the outcomes of interest are behavioral problems rather than cognitive development or educational achievement which have been the subject of most of the previous work linking parental time inputs and child quality. I focus on behavioral outcomes for two reasons: 1) research has shown that in addition to cognitive and educational achievement, non-cognitive or behavioral outcomes are also important predictors of success in the market place (Heckman et. al, 2000), and 2) the link between adult supervision and adolescent behavior is more direct and obvious than the link to cognitive outcomes. The third factor that distinguishes this work from others is the employment of family fixed effect and instrumental variables (IV) techniques to account for the fact that mothers do not randomly select into the work force, nor do they randomly choose to arrange for their children to be supervised when they do. In this analysis, government (and particularly federal) child care subsidies and local area employment conditions are used as instruments for adult supervision.

The rest of the paper is organized as follows: section II presents existing empirical work regarding the effect of parental time on child outcomes as well as background on the child care subsidy programs studied here, section III outlines the conceptual

framework and estimation strategy, section IV the empirical results, and section V concludes.

II. Background

A. Previous Empirical Work

1. Existing Research on the Effect of Time Inputs on Child Outcomes

Empirical research on the effect of parental or adult time inputs on adolescent behavior is largely absent from the economic literature. Much of the previous empirical work has focused on the impact of maternal employment during a child's early life, specifically the first three years of life, and has typically defined child outcomes as some cognitive outcome (such as child scores on the Peabody Picture and Vocabulary Test, or PPVT, reading comprehension and math exams). Many researchers conducting this sort of analysis utilize the National Longitudinal Survey of Youth Child-Mother file (NLSY-CM) which contains detailed information on both maternal characteristics and child outcomes. Because the NLSY does not contain specific information on the time parents spend at home with their children, researchers have typically estimated the effect of maternal employment (rather than the effect of parental time, per se) on child outcomes. The findings have been largely inconsistent, with some authors finding a positive effect, others no effect, and still others negative effects of maternal employment on child cognitive and educational outcomes.[1]

[1] For example, Blau and Grossberg (1992) find that maternal employment in the first year of life has a negative impact on child cognitive development as measured by the PPVT, but a positive effect in years two and three. Leibowitz (1977) found an effect of maternal employment on the PPVT. Datcher-Laury (1988) found a positive effect of maternal time on the educational attainment of 20-26 year olds for highly

In addition to the absence of any examination of the effect of maternal employment on adolescent outcomes, there has also been little attention paid to the effect of maternal employment on non-cognitive or behavioral outcomes, despite recent evidence that non-cognitive outcomes have serious implications for future labor market success, Heckman et. al.(2000).[2] The studies that have been conducted exist largely outside the economic literature. A major short-coming of most of this literature is its failure to account for the fact that parents do not randomly select whether and how to supervise their children so that any relationship between adult supervision (or the lack thereof) and adolescent behavior need not be causal. Despite this shortcoming, it is useful to summarize some of these findings here.

The medical literature on the subject of children in self-care focuses on the effect of self-care on substance abuse, risk taking, self-esteem and depression, and most of these studies have found a strong positive correlation between these outcomes and adolescent self-care. Richardson et. al. (1993) surveyed nearly 4,000 ninth graders and compared mean scores for substance use, risk taking, grades and depressed mood by type of after school care using analysis of variance. The authors found that adolescents who were not supervised by adults after school had significantly greater problem behavior than those who were supervised by an adult. However, the authors find that this effect is mitigated if parents consistently monitor the adolescents' whereabouts. Mulhall et. al. (1996) likewise found that latchkey youth who were home alone two or more days per week

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educated mothers using the PSID. Ruhm (2000) and Stafford (1987) found negative effects of maternal employment on cognitive development.

[2] Neidell (2000) looks at the effect of continuous maternal time on both cognitive and non-cognitive outcomes in the first three years of life and finds a positive effect on child self-perception.

were four times more likely to have gotten drunk in the past month than youth with more regular parental supervision. A study by Berman et. al. (1992) of the effect of after school child care and self-esteem in school age children found that children in self-care experience more social isolation, but did not score any lower on self-competence exams. However, children left in the care of older siblings were at greater risk for negative effects on self-esteem and social development.

Sociologists and developmental psychologists have also investigated the relationship between self-care and adolescent behavior. The results in this literature are more mixed than those found in the medical literature. For example, Galambos and Maggs (1991) compared 112 twelve and thirteen year olds in adult care with those in self-care and generally found no differences with respect to peer involvement, association with deviant peers, problem behavior or impulse control. Vandell and Ramanan (1991) look at the effects of mother care, latchkey care and other adult care after school on the outcomes of 390 third through fifth graders. They find that latchkey care was associated with more behavior problems as measured by the Behavioral Problems Index. They also find that children in the care of single mothers after school have lower PPVT scores and higher ratings for antisocial behavior, anxiety and peer conflicts. However, they find that after controlling for family income and emotional support (as measured by the HOME score), the differences disappeared.

As already noted, the main drawback of this literature is its failure to account for unobserved parent and child characteristics that may be correlated with both the decision to allocate time to child care and adolescent outcomes, thereby affecting our ability to draw causal inferences regarding the effect of self-care on adolescent behavior. In very

few cases do researchers also attempt to examine parental practices and the nature of the parent-child relationship in considering the association between self-care and adolescent behavior. Steinberg (1986) is one exception. Steinberg estimated the determinants of self care and found that parental permissiveness was associated with self-care and that parental permissiveness also explained a small portion of variance in children's susceptibility to antisocial peer pressure.

2. Existing Research on the Effect of Child Care Costs and Subsidies on Maternal Employment

There is also a rich economic literature on the effect of child care costs on maternal employment. These analyses typically exploit variation in the available child care subsidies for working mothers to estimate this effect. The analyses uniformly conclude that child care costs negatively affect maternal employment, though they differ in their estimates of maternal participation elasticities with some estimates as low at -.20 (Connelly, 1992) and others as high as -.98 (Kimmel, 1998). The elasticities vary with the age of the youngest child - mothers with children under 6 are more responsive to changes in the cost of child care. They also vary with the mother's marital status, though the evidence here is more conflicting. Most research has found single women to be more responsive to the costs of child care, though more recent analyses by Woodhouse (2000) based on the consumer expenditures survey has found negative employment elasticities with respect to childcare costs for married mothers, but not single mothers. Yet none of this research touches on the questions posed in this analysis – what is the effect of child

care subsidies on supervision of school age children and, by extension, on child outcomes?

B. Background on Child Care Subsidy Programs

1. History of Federal Child Care Subsidy Programs

Child care subsidies for low-income families provided by the US federal and 50 state governments have grown considerably since 1988 and funding for three programs that are the subject of this analysis totaled nearly $7 billion dollars by 1999 (GAO, 2001). To put this figure in perspective, this amount is nearly half the entire TANF allocation for 2002 ($16.7 billion). The stated purpose of government subsidized child care programs is primarily to help low-income families support themselves by work rather than welfare by reducing the cost of maternal employment. Below is a brief description of these programs including their dates of implementation, target population and overall spending within each program.

Federal and state provision of child care subsidies takes multiple forms including tax credits, free programs for pre-school age children, and child care subsidies in the form of vouchers.[3] In addition to differences in structure, the programs serve families that differ in terms of their income, welfare receipt and, by extension, marital status. One of the first federal programs is Head Start which was founded in 1965 to improve the social competence, health and nutrition of low-income children ages 3-5. Children in families below 100 percent the federal poverty level or receiving welfare are eligible. Many state

[3] For a more detailed history of the programs, see Blau, David "Child Care Subsidy Programs." NBER working paper #7806, July 2000.

school systems have also begun extending public school systems to include pre-kindergarten programs, patterned after Head Start, serving children 3-4 years of age.

In 1990 the federal government introduced its fist major direct subsidy programs. Two of the programs were specifically intended for welfare recipients -- the Aid to Families with Dependent Children (AFDC) Child Care and AFDC Transitional Child Care programs. By providing child care subsidies, the former enabled welfare mothers to participate in education and training activities during the day and the latter helped families who had recently moved off welfare by reducing the cost of employment. Also in 1990, the At Risk Child Care program and the Child Care and Development Block Grant (CCDBG) were established. The At Risk Child Care program was designed to prevent families from going on welfare by enabling mothers to work. The CCDBG was not linked to any welfare program though it was targeted to families at or below 85 percent of the state median income. In 1996, funding for the CCDBG and the AFDC Child Care, Transitional Child Care and At Risk Child Care were consolidated into a single program – the Child Care and Development Fund (CCDF), with overall funding considerably increased. In contrast to Head Start and the welfare-related child care programs, funds available through the CCDBG and CCDF are spent primarily on non-welfare recipients (GAO 2001). Welfare recipients are still eligible for child care subsidies through the welfare program itself, renamed TANF after 1996.

Table 1: Major Federal Child Care Subsidy Programs

Program	Years in effect	Federal Funds	Basis of State Allocation
Head Start	1965-present	$4.23 billion (1998)	Individual grantees apply for funds
AFDC dependent care & transitional child care	1990-1996	$1.06 billion (1996)	No limit: state expenditures matched by federal funds
AFDC at risk Child care	1990-1996	$291 million (1996)	Limited: state expenditures matched by federal funds
CCDBG	1990-1996	$899 million (1996)	Per capita income; number of children in the state
CCDF	1996-present	$3.5 billion, (1998)	Per capita income; number of children in the state
TANF	1996-present	$1.9 billion (1998)	Grant from the federal government to the state – states choose how much to allocate to child care

All amounts in nominal dollars

The major child care programs available during the period of study (1986-1998) can be categorized into three main groups: 1) Head Start/public pre-kindergarten programs, 2) subsidies linked to AFDC/TANF, and 3) subsidies independent of welfare receipt. The families served by these three program types differ in the age of the children served and family welfare receipt, with the latter having implications for both marital status and income.

In terms of the different ages of the children served by the respective programs, the Head Start/public pre-kindergarten programs serve children 3-5, while a significant portion (35 percent) of the children served by the major non-welfare related subsidy program in 1998 were school age (figure 1). Unfortunately, age breakdowns of the children served by the welfare-related programs are not available. However, it should be noted that prior to welfare reform in 1996, mothers with pre-school age children were

typically exempted from participating in school or work activities, suggesting that at least some of the child care subsidies may have been used to care for school age children, at least prior to 1996.

In addition to differences by child age, the first two programs serve very low income families and families on welfare, while the third has higher income cutoffs and is reported to be used only rarely by welfare recipients. As such, the Head Start and welfare programs serve not only poorer families but also families more likely to be headed by single mothers compared with the non welfare-related subsidy programs. These key differences in the types of families that utilize the various programs will inform the analyses.

Despite the large increases in federal subsidies for child care and the number of children served, estimates indicate that only a small portion of those eligible for child care assistance actually receive it. Federal statistics indicate that in 1999, 1.8 million children in low-income families received federal child care subsidies (excluding Head Start) on an average monthly basis up from 1 million in 1996. Despite the strong growth in the number of children served, still only 15 percent of children eligible to receive child care subsidies do so. Head Start served an additional .83 million children in 1999 (and an additional .42 million children were served in public pre-kindergarten programs in 1997). With roughly 12.8 million living in poverty, less than seven percent participate in Head Start.

2. Variation in the Funding of Child Care Subsidies Across States and Over Time

Variation in the child care subsidy amount available over time and across the 50 states enables identification of their effects on the probability of adult supervision after school. Over time there has been a large increase in federal and state funding for child care subsidies. Funding for Head Start has increased from $1.2 billion in 1988 to $4.4 billion in 1998, as has funding for pre-kindergarten programs which totaled only $177 million in 1988 and grew to over a billion in 1998. In 1986, child care through AFDC or the CCDBG had not yet been established. In 1992, federal and state funding through the AFDC and CCDBG totaled $1.7 billion, increasing to $3.1 billion in 1995 and to $5.4 billion by 1998.

Variation across states in the subsidy level arises from two sources – the funding formula (which is based on the number of children and per capita income per state) and requirements for state spending. The requirement of state matching to draw down federal funds gives states a wide degree of discretion over the total amount of child care subsidies available in the state. The AFDC child care programs provided matching federal funds based on state expenditures and the old CCDBG did not require any state match but did include a state maintenance of effort requirement (states could not substitute new federal funding for state funds previously allocated for child care). Funding under the CCDF likewise requires state contributions to qualify for federal funding.[4] Beyond spending enough to obtain its share of federal child care funds, a state may elect to spend additional state funds to provide child care subsidies to low-income children. According to the Childrens Defense Fund, states have varied so widely in their commitment to subsidizing

[4] Under CCDF rules, in order to draw down its federal allocation, a state must commit some of its own funds to meet federal requirements (typically linked to pre-CCDF state funding levels under the AFDC child care program and CCDBG). States may elect to draw down some or all of their federal allocation and,

child care that in 1994, the ten states with the highest commitment to child care invested four and a half times as much per child than did the ten states with the least commitment (CDF, 1997). Figure 3 shows the percent increase in total funding for child care between 1992 and 1998, by state. The overall percent increase in funding is 250 but ranges from a low of 86 percent for Ohio and a high of 1,491 and 2,247 percent for Indiana and Hawaii, respectively.[5]

Unfortunately, information on whether states that increased spending on the child care subsidies analyzed in this paper also increased spending on other child care or after school programs is not readily available. If spending on other programs is correlated with spending on the child care subsidies analyzed in this study, estimates of the effect of the child care subsidies on the probability of adult supervision may suffer from omitted variable bias. For example, if states that spend a lot on the child care subsidies analyzed in this paper also spend a lot on other child care and after school programs, the estimates in this paper are likely to over-estimate the effect of the child care subsidies. There is no single source of information on state spending on after school programs or other state-only funded child care programs across all the states and over time. There is some data that was gathered by the Department of Education through its Schools and Staffing Surveys conducted in 1988, 1992 and 1994. These data suggest that the number of public after school programs and proportion of students served by them in a given state may be positively correlated with spending on the child care subsidies analyzed in this paper.

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to date, the majority have drawn their full allocation of federal funds.

[5] Because of the unusually large increases in Indiana and Hawaii in the level of spending on child care subsidies, all regressions presented in section IV were run twice – once with all states and a second time excluding these two states. The latter results were stronger than the first, suggesting that Indiana and Hawaii did not disproportionally affect the results.

The correlation between the proportion of children participating in public after school programs in a given state and combined state and federal expenditures through the AFDC program and the CCDBG in the few years for which these data are available are .30 and .33, respectively.[6] Though the correlation is not large, it is not negligible either, and the potential for over estimation of the effect of child care subsidies on adolescent supervision should be kept in mind when interpreting estimates presented later.

C. Child Care Arrangements for School Age Children

Employed mothers use a variety of afterschool child care arrangements for children age five to fourteen, the most common of which (apart from paternal care) appears to be in-home care by a non-parent (Figures 2a and 2b). According to information from the 1995 Survey of Income and Program Participation (SIPP), 19.4 percent of children age five to fourteen with an employed mother are cared for in their own home by a non-parental relative or non-relative (an additional 21 percent are cared for by their fathers). Another 19.2 percent are cared for in another home of a relative, non-relative or family day care provider and 7.8 percent are cared for in an organized care facility (Green Book, 2000). Among pre-school age children, 14 percent are cared for in their own home, similar to school age children. However, pre-school age children are more likely to be cared for in an organized facility compared with school age children (26 percent versus 8 percent) and are also more likely to be cared for in another home than school age children (36 percent versus 19 percent). As expected, the proportion of children in self care is much greater among school age children (12 percent) compared

[6] The correlation is generally insensitive to weighting by the number of children in each state.

with pre-school age children, none of whom were reported to be in self-care. Unfortunately, there are no estimates specific to the age group that is the focus of this analysis – young adolescents age nine to fourteen.

III. Conceptual Framework and Estimation Strategy

A. Theory of Time Allocation and Child Quality

This paper relies on the theoretical model developed by Becker (1975 and 1981) as does much of the previous empirical work that examines the effect of the amount of time mothers spend with their children on child outcomes. In this model, the family maximizes utility that is a function of various commodities and leisure. "Child services" is one type of commodity and its level depends on both the quantity and quality of children. Child quality is itself a function of the market inputs and parental time devoted to child care. As such, the utility maximization problem is subject to a budget constraint, time constraint and production function for child quality, described in greater detail below.

The family maximizes the following utility function:

$$U=f(Z,L;\ e) \qquad (1)$$

in which the two main choice variables are Z (consumption) and L (leisure). "Child services" is an element of Z and quantity and quality of children determine the level of child services. Child quality is in turn subject to the following child production function:

$$\text{Child Quality}=f(T,C;\ X^m,\ X^c,\ e) \qquad (2)$$

Where T is the time input, C is consumption and maternal and child characteristics (X^m and X^c, respectively) affect the productivity of the time inputs. For reasons discussed below, the error term (e), which consists of unobserved child characteristics that may affect behavior, is likely to be correlated with T, time input, the variable of primary interest in this analysis.

The utility maximization problem is also subject to the following budget and time constraints:

$$p(Z+C) + (1-m)T = w(24-L) + A \quad (3)$$

where p is the price of consumption goods, T the time devoted to child care, m the child care subsidy, w the wage rate, L is leisure and A is assets or unearned income. And

$$24 - L = H \quad (4)$$

where L is leisure and H, the number of hours in work.

In this paper I focus only on time, not market, inputs as factors affecting the production of child quality for two reasons. First, the income variables in the NLSY are subject to considerable measurement error (as described later). In addition to measurement error, income variables are subject to endogeneity bias for which I am unable to control. Second, there have been many studies that examined the effect of income on child outcomes, with generally mixed results. Mayer (1997) summarizes much of the existing literature and presents results from her own analyses based primarily on the NLSY and concludes that above a basic subsistence level and controlling for important maternal and child characteristics, an increase in income has little discernible impact on child quality.

With respect to time inputs, I cannot distinguish between maternal and non-maternal time in the data – both are simply approximated by the probability that a child is supervised by an adult after school. The comparative statics of interest derived from this model are 1) the effect of adult supervision after school on adolescent behavior, and 2) the effect of a change in the availability of child care subsidies on the probability of adult supervision, holding all else constant.

Estimation of the relationship between adult supervision after school and adolescent behavior is complicated for two reasons. First, there may exist unobserved characteristics of the mother that are correlated with both the decision to supervise the child and child behavior. Second, there may exist unobserved characteristics of the child that are correlated with the both adult supervision and child behavior.

Each complicates estimation of the effect of adult supervision on child behavior by introducing a potential endogeneity bias. Regarding the former, parents that are "more permissive," for example, may spend less time supervising their children and also may be more tolerant of certain behaviors, leading to an overestimation of the effect of adult supervision on child behavior. Regarding the latter, parental decisions to allocate time to their children may be influenced, in part, by the parents' opinions with respect to each child's current level of quality (or stock of human capital) and potential for additional growth. Parents may choose to allocate time to child care in one of three ways: 1) *nondiscriminatory time allocation* - parents do not consider the child's current stock of human capital (either relative to other children or absolute) in their decision to allocate time, 2) *achievement maximization* - parents will invest more in those children with a higher potential for achievement maximization and 3) *compensatory time allocation* -

parents devote more time and/or resources to caring for those with the least ability. The strategy chosen will likely be affected by child characteristics that are not observed by the researcher and are also correlated with adolescent behavior. If, for example, parents follow an *achievement maximization* strategy, then they may arrange supervision for those children who are already "high quality." In this case any estimate of the effect of supervision on adolescent behavior is likely to overestimate the effect of supervision. If, on the other hand, parents follow a *compensatory time allocation* strategy, they will be more likely to arrange supervision if their children are prone to negative behavior, in which case we would underestimate the effect of supervision on adolescent behavior.

Thus to consistently estimate the effect of adult supervision on adolescent behavior, one must consider the potential correlation between the error term in the production function for child quality and the time inputs. Estimates of the effect of adult supervision after school on adolescent behavior that do not consider this relationship may be subject to endogeneity bias. In this analysis, I control for the potential endogeneity using family fixed effect and instrumental variable approaches.

The relationship between adult supervision and the amount of child care subsidies available is more straightforward to estimate because of the presumed exogeneity of local labor market conditions and funding for child care subsidies in this model. The child care subsidies that are the focus of this analysis are those mandated and primarily funded by the federal government. Though the funding is based in part on state expenditures (through the state match and maintenance of effort requirement), the potential endogeneity of state funding for child care is mitigated by the strong federal role. The inclusion of state fixed effects also help to purge the estimates of endogeneity or omitted

variable bias that may result from the use of state spending/allocation measures as instruments.

C. Estimation Strategy

The outcomes of interest in this analysis are antisocial or risky adolescent behavior. The specific behaviors include: skipping school, getting drunk/high, stealing something and hurting someone, and are described in greater detail in the data section of this paper. The basic estimating equation for the i^{th} child at time t is specified as follows:

$$Y= \beta_0+\beta_1 Supervision + \beta_2 X^c +\beta_3 X^m + \beta_4 X^s + \beta_5 Year +\beta_6 State + \varepsilon \qquad (5)$$

In this equation Y is an indicator equal to one if the adolescent engaged in each of the above mentioned behaviors and Supervision is an indicator equal to 1 if the child responds that there is usually an adult present when the child returns from school and zero if not. A vector of child-specific factors (X^c) includes age, gender, the number of children less than 19 in the family, and whether the child has an older sibling. The vector X^m consists of mother-specific variables including her age, age at first birth, marital status, AFQT score (a measure of cognitive ability), whether her mother worked when she was fourteen years old, and highest grade completed. These variables are likely to affect the maternal employment decision, likelihood of supervision and the quality or productivity of time inputs.

To control for characteristics that vary on the state level and may be correlated with the child care subsidy level and/or the outcome of interest, I include a vector of state

level time-varying and time-invariant controls represented by X^s in the above equation. The vector X^s includes welfare caseloads per 1,000 in the state, state per capita wage income, and whether the child lives in a central city, non-central city or rural area. Finally, vectors of state and year dummies, denoted by state and year in the above equation, are included. The error term is represented by ε.

To account for the fact that the decision to supervise young adolescents (either by reducing the number of hours at work or providing child care) may be influenced by unobserved characteristics related to the production of child quality, I both employ a family fixed effect and instrument for adult supervision. The family fixed effect enables on to control for any time-invariant maternal of family characteristics and avoid omitted variable or endogeneity bias. For example, an unobserved family characteristics such as parental permissiveness may be negatively correlated with both the supervision decision and child behavior, resulting in an overestimate of the effect of supervision on adolescent behavior in an OLS regression. On the other hand, the supervision decision may also be correlated with certain parenting skills that could bias the results in the opposite direction. For example, parents who have been very effective in encouraging non-risky behavior in their children may feel more free to leave their children unsupervised, knowing that they will be unlikely to engage in risky or antisocial behavior. In this case, estimates from an OLS regression would underestimate the effect of supervision on behavior.

For the IV regressions, I include the following three instruments: 1) a measure of the local area employment conditions, 2) whether the adolescent has a pre-school age sibling, and 3) the amount of government child care subsidies per child fourteen years of age or younger in the state, funding for Head Start and state pre-kindergarten programs

per child under 5 in the state. Each instrument is described in greater detail below in the section describing the instrumental variable results (Section IV B).

I estimate equation 5 using a linear probability regression three times, first using OLS, the second time including a family fixed effect, and the third time instrumenting for supervision. A linear probability model was selected over probit or logit models because it requires less restrictive assumptions regarding the distribution of the error term. However, a disadvantage of linear probability estimation is that the resulting probabilities are not restricted to the zero – one interval. In the analysis presented here, the linear probability regressions predicted a probability slightly greater than one for eight to fifteen observations. The regressions were run twice – once including these observations and another time excluding them, with no discernible change in the results. For the instrumental variable analysis, I estimated the effect of supervision on adolescent behavior twice, once with a two stage linear probability regression and again with a two stage probit. For the latter, I estimated the probability of supervision as a function of the instruments and other exogenous variables in a first stage and include the resulting predicted probabilities of supervision and exogenous variables in a second stage probit regression of the adolescent behavioral outcomes. The estimated effect of supervision (calculated at the sample means) was very similar to that obtained from the linear probability models.

III. Data

The data used are the 1998 wave of the National Longitudinal Survey of Youth (NLSY) Child- Mother file. The NLSY is a cohort of 12,686 men and women age

fourteen to 21 as of December, 1978. The original NLSY survey design over-sampled blacks and Hispanics. The survey also over-sampled poor households: approximately three quarters of the black and Hispanic children are from the supplemental poverty sample as are one third of white children in the analysis sample. Thus over half the analysis sample is drawn from the supplemental poverty sample. The NLSY has conducted annual surveys of the original cohort and beginning in 1986, began additional biannual surveys of the children of the women in the original cohort. The major advantage of the NLSY is the ability to link an extensive set of child and mother characteristics. The disadvantages include the relatively small sample size and potential cohort effects. To account for potential cohort effects, I include controls for both the current age of the mother as well as whether she was a teen mother.

The information on adolescent behavior and adult supervision is gathered as part of the child/young adult questionnaire of the NLSY administered every other year from 1986-1998. Questions in the survey with respect to supervision and adolescent behavior (skipping school, getting drunk/high, stealing something, and hurting someone badly enough to require medical attention) refer to the period one year prior to the date of interview and are asked of children age ten to fifteen at the time of interview (nine to fourteen at the beginning of the reference period).[7] Data on accidents are available for children of all ages and are gathered from the child's mother. I focus on adolescents nine to fourteen, rather than their younger siblings, because this is the only age group for whom information on adult supervision is consistently collected. I excluded all children

[7] Until 1994, these questions were limited to those 10-14 at the time of interview. Beginning in 1994, a young adult questionnaire was administered to children greater than 14 at the time of interview. However, I have limited the number of children in this older age group for reasons discussed later.

over fifteen at the start of the reference period for two reasons: their behavior is arguably less likely to be significantly influenced by adult supervision after school and they are disproportionately born to very young mothers (teen mothers) in the original NLSY cohort which may bias the results.

The data from the NLSY were merged with wage and employment data from the BEA, welfare caseloads from the Department of Health and Human Services, child care subsidy information gathered from multiple sources (described below) and child care costs from the Children's Defense Fund. County level employment to population ratios were created using data from the BEA employer surveys for 1986-1998. Data on child subsidies were gathered from multiple sources including the House Committee on Ways and Means Green Books and the federal Administration for Children and Families Child Care Bureau and the Head Start Bureau. Data on state funding of pre-kindergarten program from 1986-1998 were gathered via telephone interviews with each state by the author. Information on the costs of child care in each state in 1998 was gathered by the Children's Defense Fund in coordination with state research and referral agencies (CDF, 1999). All dollar amounts were converted to real terms in the analysis (1998 dollars).

Tables 2 and 3 contain information on the likelihood of engaging in each of the outcome behavior by child and maternal characteristics, respectively. As is evident from Table 2, boys are more likely to engage in each of the behaviors, with the exception of getting high/drunk, the probability of which is roughly even across gender. Three of the behaviors, skipping school, getting drunk/high or stealing something, increase considerably with the age of the child while hurting someone does not. Table 3 contains information on the probability of each outcome by maternal education, marital status and

race. Children of mothers without a high school degree, who are single and who are black, are more likely to engage in each of the behaviors than children of married parents, who are non-black and who have a high school degree or higher. The one exception being black children who appear have a slightly lower probability of getting drunk/get high than non-black children. These patterns have strong implications for interpreting the IV estimates, a point to which I return later. The proportion of children who report these behaviors also differs by the education of the mother, her marital status and race (Table 3). Children are more likely to engage in these behaviors if their mothers are single and/or less educated.

Table 3 displays the mean and standard deviation of all the variables for the entire sample and stratified by maternal education, marital status and race.[8] The probability of a child being supervised by an adult after school is very similar across marital status, relatively similar across race (with black children slightly more likely to be supervised), but not at all similar for children born of mothers with different educational attainment. Children born of mothers without a high school degree are more likely to be supervised than those whose mothers have a high school degree or more. This likely reflects the fact that women without a high school degree are less likely to work (or less likely to work full time), more likely to be on welfare and therefore more likely to be at home when their children return from school. Given that black mothers in this sample tend to be slightly less educated than their white counterparts, this may partly explain the high probability of supervision reported by black children.

[8] Although the NLSY provides sample weights, MaCurdy et. al. (1998) advise against the use of them. In addition, since this analysis is based on a subset of the children of the original cohort, the weights assigned

These patterns of supervision and adolescent behavior in the raw data might suggest that supervision is positively correlated with antisocial behavior. However, if we look at engagement in each of these activities stratified by supervision status (Table 4), we see that the probability of engaging in each of the behaviors decreases if the child is supervised. This is true for sample as a whole and stratifying by maternal education or marital status.

The relationship between maternal work and supervision is unambiguously negative for all mothers, yet the magnitude of the correlation varies based on the education level of the mother. As we can see from Table 5, if a mother works, her adolescent is less likely to be supervised by an adult upon returning home from school – 70 percent of adolescents are supervised if their mothers work, compared with 93 percent of adolescents whose mothers do not work. It is interesting to note that mothers with less than a high school degree are considerably less likely to work (61 vs. 81 percent of all mothers in the NLSY sample), but when they do, their children are more likely to be supervised than the children of more educated mothers (80 versus 69 percent). This may reflect less educated mothers' greater reliance on welfare and/or part time work: when these mothers do not have access to child care, they may be more likely to apply for welfare rather than work or work fewer mothers, compared with more educated mothers. By this reasoning, when less educated mothers do work, they would be more likely to have successfully arranged child care for the hours during which they are absent.

IV. Regression Results

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for the original cohort are not necessarily correct. These results are not necessarily representative of all

In the first part of this section I present the results of least squares and fixed effect regressions of equation (5) for skipping school, getting drunk/high, stealing something and hurting someone. I follow this with a presentation and discussion of the IV regressions and results.

A. OLS and Fixed Effect Estimation

In OLS regressions, supervision has a small negative and significant effect on each of the four outcomes, ranging from -.020 for skipping school and -.021 for getting high/drunk to -.036 for hurting someone and -.043 for stealing something (Table 6). In addition to the effect of supervision on adolescent behavior, some of the child and maternal characteristics also appear to have significant and notable effects. Males, as expected, are more likely to skip school, steal something or hurt someone relative to females. This is particularly true for hurting someone – males are eleven percent more likely than females to hurt someone. Having an older sibling appears positively correlated with all outcomes except hurting someone.

Among maternal characteristics, those that appear to consistently affect risky and anti-social adolescent behavior are having less than a high school degree (positive effect) and AFQT score (negative effect). These maternal characteristics may indicate poorer parenting skills, or, because they are also correlated with low income, may reflect the effect of income on child outcomes. For this reason, I estimate the same equation with family income (Appendix Tables 1 and 2). These regressions are problematic for two reasons. First, household income is subject to endogeneity bias. Second, the income

children in the US.

variables collected as part of the NLSY are subject to considerable measurement error. After 1994, the NLSY was conducted biannually and as a result information on family income is available in the year prior to the interview year, but not the year of interview. Thus, I estimated income in the survey year based on an average of the values for adjacent years. For 1998, I averaged income for 1997 and 1996 (which is itself an average of 1995 and 1997). In addition, the income variables that are available appear quite noisy, varying considerably from one year to the next. As such, the results presented in Appendix Tables 1 and 2 should be interpreted with caution.

When family income is included, the OLS results change very little but being a high school drop out is no longer positively associated with negative adolescent behavior, suggesting that poverty, rather than poor parenting skills may be responsible for the negative effect on adolescent behavior (Appendix Table 1). Family income, as expected, is consistently and negatively correlated with risky and anti-social behavior.

As noted previously, it is not clear whether the OLS regression estimates accurately reflect the effect of supervision on adolescent behavior or whether they are biased because of unobserved characteristics of the child or mother that are correlated with both the supervision decision and adolescent behavior. The inclusion of a family fixed effect may control for endogeneity bias if we assume that any unobserved characteristics are specific to the family and do not vary across the children in the home. This assumption may be appropriate since the mother makes the supervision decision. With the exception of getting high/drunk for which the effect of supervision is very imprecisely estimated, results from the fixed effect regressions (Table 6) are very similar to those from OLS. This suggests that any unobserved maternal characteristics correlated

with both the supervision decision and adolescent behavior (such as parental permissiveness or parenting skills) are minimal. However, if we believe that unobserved characteristics of the child that affect behavior are driving the supervision decision, then the family fixed effect will not correct for the potential endogeneity bias. For this reason, a third estimation strategy, instrumental variables, was employed. In the next two sections, I discuss the first and second stage results of the IV regressions, respectively.

B. First Stage Results: The Effect of Child Care Subsidies, Labor Market Conditions, and Pre-school Age Siblings on Adolescent Supervision

The first stage regressions illustrate whether the three instruments, employment conditions, presence of a pre-school age child, and child care subsidies, have any effect on the supervision of children and also whether the effect varies with certain child and maternal characteristics. Each is discussed in turn below. Given the large government investments made thus far in child care subsidies, these results are interesting in their own right, shedding light on which populations are most affected by the different subsidy programs.

The first instrument -- the measure of local labor market conditions -- is the ratio of total employment to total population in the mother's county of residence as reported in the Bureau of Economic Analysis employer surveys. This measure was used previously by Hoynes (1996) in a study of the effect of local labor market conditions on welfare receipt and employment in California. In this study, Hoynes found the county employment to population ratio to be a strong predictor of female employment. Because

supervision is negatively related to maternal work, employment conditions are likely to negatively predict supervision.

The second instrument, the presence of a pre-school age child in the home is more controversial. One could argue that the presence of a pre-school age sibling might not be exogenous. That is, the presence of a young sibling might affect adolescent behavior beyond its affect on adult supervision though one of two mechanisms. First, the presence of a younger child is correlated with larger family size and previous theoretical and empirical work has shown a tradeoff between the quality and quantity of children (Becker and Tomes 1976, Hanushek, 1992). Thus, I include family size in the regression to prevent omitted variable bias of the estimate of the effect of a pre-school age sibling on supervision.[9] Second, adolescents may get less attention overall with a preschool age child in the house. To test this, I perform a standard specification test to determine whether preschool age siblings (as well as all other instruments) are correlated with adolescent behavior independent of their effect on supervision. The results indicate that no such independent relationships exist.

Finally, two measures of the level of child care subsidies are also included as instruments. The first includes all Head Start and public pre-kindergarten funding. The second includes all funding through the CCDBG and CCDF not allocated specifically to welfare recipients. The child care subsidies linked to welfare use were excluded as IVs (though included as controls) because of their insignificant effect on the probability of adult supervision in the regressions. Removal of these as instruments prevents the improper inflation of estimates that can occur with the inclusion of weak instruments (see

Bound and Jaeger). Thus the equation to estimate the probability of adult supervision for the i^{th} child at time t (the first stage of the instrumental variable regression) is:

$$\text{Supervision} = \beta_0 + \beta_1 \text{emp/pop} + \beta_2 \text{subsidy} + \beta_3 \text{HS/pre-school} + \beta_4 X^c + \beta_5 X^m + \beta_6 X^s + \beta_7 \text{Year} + \beta_8 \text{State} + \varepsilon \qquad (6)$$

Information provided by the federal agencies that administer the child care programs on the characteristics of the families that use the subsidies was used both to inform the analyses and as a check on the validity of the instruments. Given that welfare recipients tend to use certain child care programs and not others, I ran separate regressions of the effect of child care subsidies on supervision stratified by three family characteristics that are correlated with welfare use - marital status, maternal education and race. I also stratified by two child specific characteristics- gender and age, given that supervision may vary based on these two characteristics as well.

As expected, the Head Start program has a greater effect on the supervision of children raised by single mothers and mothers who are high school drop outs while the non welfare-related subsidy program has a greater effect on the children of married mothers and mothers with at least a high school degree (Table 8). The effects of the latter also appear slightly greater for non-black families, though the difference is not as great as those based on marital status and maternal education. Unfortunately, the effect of AFDC/TANF child care subsidies is so imprecisely estimated that conclusions are difficult to draw.

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[9] It should be noted that the overwhelming majority of adolescents in the sample live in families of 4 or

Of additional interest is the fact that the instruments appear to have a greater effect on the supervision of males compared with females and of older children compared with younger children. For males, the coefficient on employment conditions decreases from -.043 to -.079, while the coefficient on the presence of a pre-school age sibling increased from .036 to .062 and child care subsidies from .35 to .40. Likewise for older children, the effect of employment conditions on adult supervision decreased from -.046 to -.08, and the coefficient on child care subsidies increases from .120 to .736. Because girls and younger children are viewed as more vulnerable, one might expect that mothers would be less willing to leave them unsupervised and thus their supervision status would be less sensitive to employment conditions and child care subsidies. Recalling figures from Table 2, both males and older children are also more likely to engage in antisocial or risky behavior. The fact that the instruments are also more binding for these groups will have strong implications for interpretation of the IV results later.

Based on these results, I included both the main effects of child care subsidy programs and their interactions with marital status in the first stage IV regressions. Ultimately, welfare-related child care subsidies were excluded as instruments though included as controls because of their insignificance in the first stage regressions and the desire to limit the analysis to strong instruments. In the first stage (Table 7), we see that the measure of local labor market conditions is negatively related to adult supervision, as expected. The non welfare-related subsidy is positively related to supervision as is its interaction with marriage. The main effect of Head Start is small and negative though not precisely estimated. Head Start funds interacted with single motherhood, however, is

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fewer children (90 percent) and three quarters live in families with 3 or fewer children.

positively and significantly related to supervision. Specification tests confirm the exogeneity of the instruments in both singular and joint tests of significance.

C. Second Stage Results: The Effect of Supervision on Adolescent Behavior

The second stage IV results suggest a much stronger effect of supervision on adolescent behavior than the OLS or fixed effects estimates. When adolescents are supervised, the probability of skipping school declines 21 percent, getting drunk/high 20 percent, stealing something 34 percent and hurting someone 56 percent (Table 6 and Appendix Table 1). However, when compared to the probability of engaging in each of these behaviors for the sample (Tables 2 and 3), the IV estimates appear inflated. To better understand why the IV results may be so large, it is necessary to consider the source of variation that is generating the IV estimates – employment conditions and child care subsidies. IV estimation has been shown to produce estimates that are a weighted average, with the weights proportional to the degree to which the instruments bind (Imbens and Angrist, 1994). In other words, those groups who are most strongly affected by the instruments influence the IV estimates to a greater extent than do those groups less strongly affected by the instruments. In this case, males and older children are both more strongly affected by the instruments (Table 8) and are also more likely to engage in the adolescent behavior that is the subject of this analysis (Table 2). This is likely driving inflation of the IV results. As an illustrative example, in IV regressions of getting high/drunk, the estimated effect of supervision of children 9-12 years old is -.08, increasing in absolute magnitude to -.273 for children 13-14 years old. Unfortunately,

stratifying by age and/or sex is not supported by the sample size. Future analyses should estimate the effects separately for those groups whose supervision is disproportionately responsive to child care subsidies or labor market conditions.

V. Conclusions

Three main conclusions can be drawn based on this analysis. First, adult supervision is associated with a decrease in risky or anti-social behavior such as skipping school, using alcohol or drugs, stealing something and hurting someone. This relationship persists after controlling for unobserved family or maternal characteristics that may be correlated with both the supervision decision and child behavior, such as parental permissiveness. While the exact magnitude of the effect of supervision depends on the method of estimation (OLS, FE or IV), the sign does not: adult supervision has a negative effect on risky behavior in all cases.

Second, the availability of government subsidized child care increases the likelihood that a school age child will be supervised by an adult upon return from school, suggesting positive spillover effects of programs that target pre-school age children. In addition, the effects are strongest for the children of mothers who lack a high school degree as well as older, male children. The latter likely reflects the fact that these children may be considered less vulnerable and therefore in less need of adult supervision than other younger children and girls. Thus while young children and girls are highly likely to be supervised regardless of the availability of subsidies, the supervision of older children and boys is relatively more sensitive to the subsidies.

A third and related conclusion follows from an analysis of the "inflated" IV estimates compared with the OLS and FE estimates. Because IV estimates are a weighted average effect, with the weights proportional to the extent to which the child's supervision is affected by the subsidies, the IV estimates disproportionately reflect the effect of supervision on older children and males. Thus, the large size of the IV estimates indicates that the older children not traditionally targeted by child care programs, but who appear to benefit via spillover effects, stand to gain the most from expanding subsidy programs in terms of lowering their engagement in risky or antisocial behavior.

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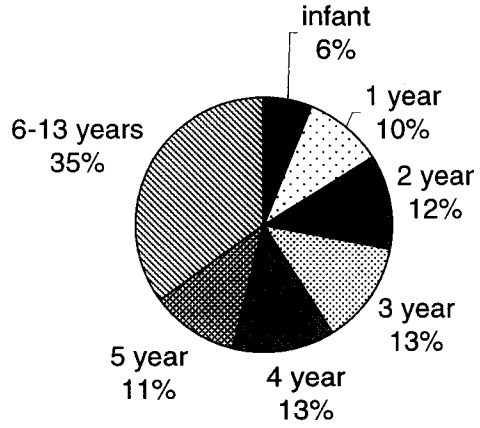
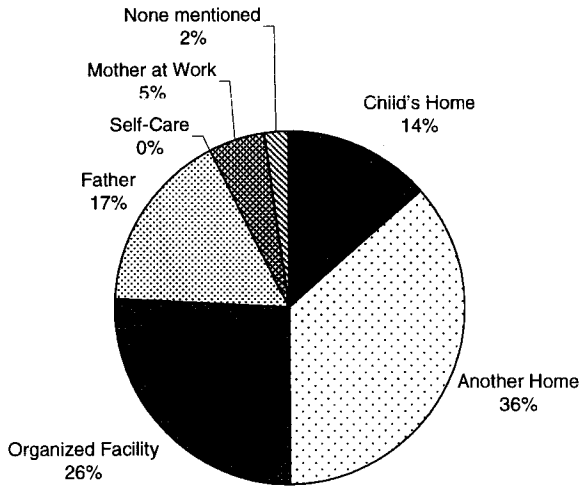
Figure 1: Percent of Children Served with CCDF Funds, by Age, 1998



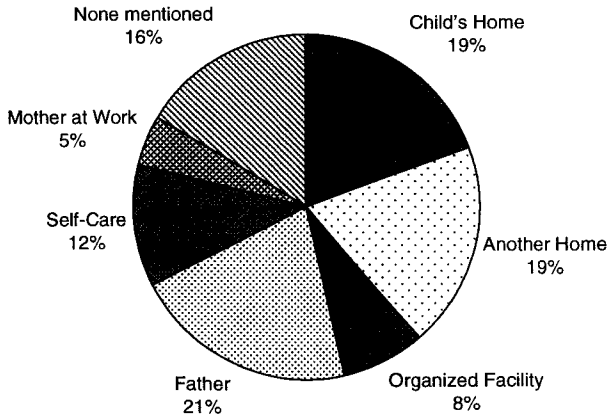
Source: Dept. of Health & Human Services as reported in the 2000 Green Book

Figure 2a: Type of Child Care Arrangement, Children under 5, 1998



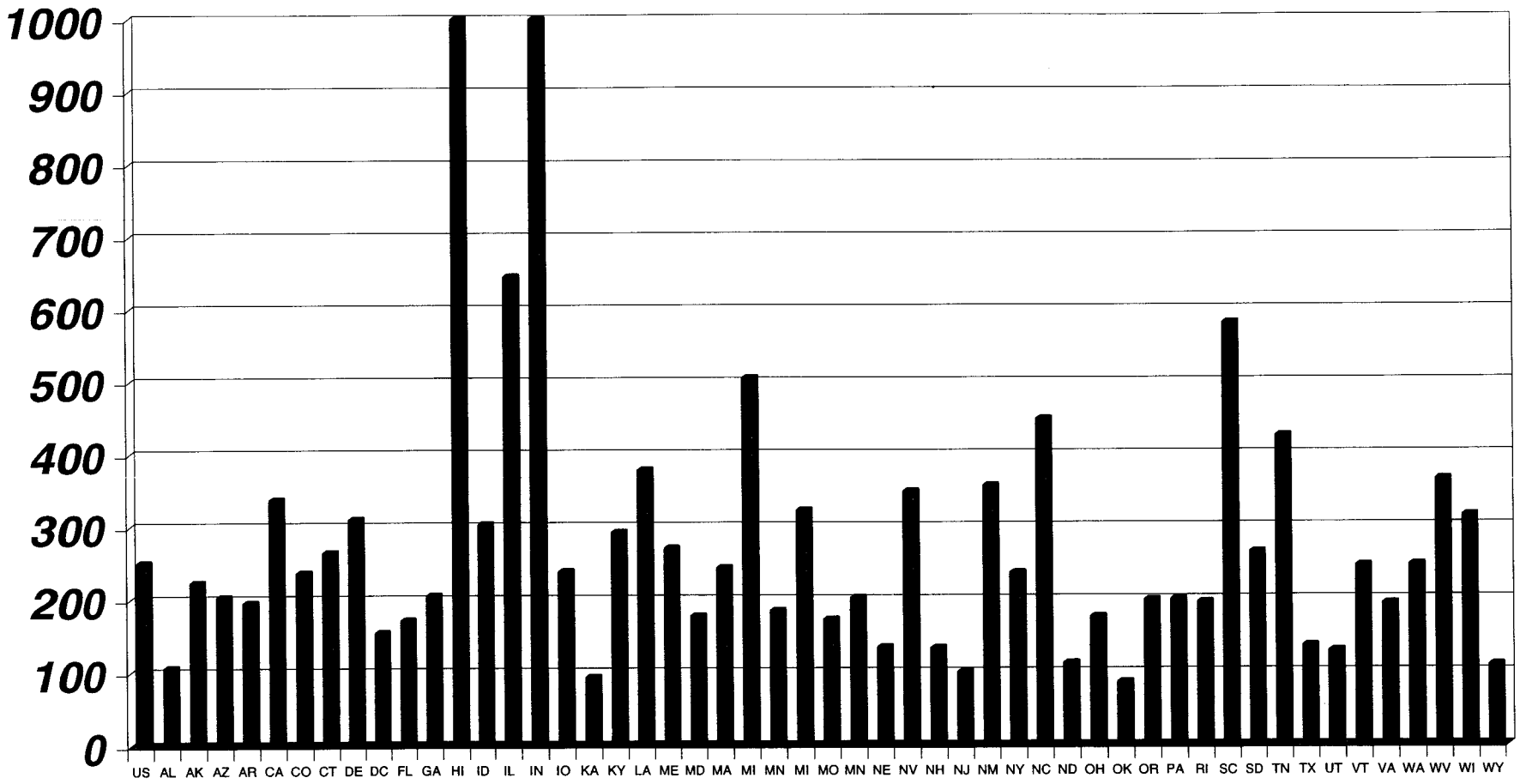
Source: 1995 SIPP estimates as reported in the 2000 Green Book

Figure 2b: Type of Child Care Arrangement, Children 5-13, 1998



Source: 1995 SIPP estimates as reported in the 2000 Green Book

Figure 3: Pecent Change in Total Funding of Child Care, 1992-1998



Source: Green Book 2000

Note: Hawaii (HI) and Indiana (IN) actually exhibitted growth on the order of 2247% and 1491%, but are capped at 1000% in this figure.

Table 2: Probability of Outcome, by Age and Gender

Outcome	Probability All	Probability male	Probability age 9	Probability age 10	Probability age 11	Probability age 12	Probability age 13	Probability age 14
Skip School	0.078	0.090	0.046	0.055	0.058	0.088	0.128	0.182
High/Drunk	0.046	0.043	0.007	0.012	0.020	0.051	0.116	0.181
Steal Something	0.119	0.142	0.090	0.108	0.096	0.131	0.166	0.154
Hurt Someone	0.198	0.255	0.180	0.194	0.198	0.223	0.197	0.169

Table 3: Means of NLSY Variables by Maternal Education, Marital Status and Race

	All children		>=HS		<HS		married		Single		black		non-black	
Variable	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**
supervision	0.753	0.431	0.735	0.442	0.842	0.365	0.756	0.430	0.749	0.434	0.772	0.419	0.743	0.437
Adolescent Behavior														
skip school	0.078	0.268	0.066	0.248	0.137	0.344	0.057	0.232	0.108	0.310	0.087	0.282	0.074	0.261
got high/drunk	0.046	0.209	0.042	0.201	0.065	0.246	0.034	0.181	0.063	0.244	0.043	0.204	0.047	0.212
stole something	0.119	0.324	0.108	0.311	0.171	0.376	0.093	0.290	0.156	0.363	0.146	0.353	0.105	0.307
hurt someone	0.198	0.399	0.192	0.394	0.227	0.419	0.177	0.381	0.229	0.420	0.223	0.416	0.186	0.389
Child Characteristics														
age of focal child	11.619	1.412	11.605	1.402	11.686	1.456	11.595	1.414	11.653	1.408	11.699	1.426	11.579	1.403
male	0.499	0.500	0.496	0.500	0.512	0.500	0.495	0.500	0.503	0.500	0.482	0.500	0.507	0.500
older sibling present	0.425	0.494	0.410	0.492	0.499	0.500	0.424	0.494	0.427	0.495	0.441	0.497	0.417	0.493
pre school age sibling	0.189	0.392	0.186	0.389	0.205	0.404	0.196	0.397	0.181	0.385	0.214	0.410	0.177	0.382
black	0.335	0.472	0.335	0.472	0.333	0.472	0.200	0.400	0.526	0.499	1.000	0.000	0.000	0.000
hispanic	0.218	0.413	0.193	0.395	0.337	0.473	0.227	0.419	0.205	0.404	0.000	0.000	0.328	0.469
Maternal/Family Characteristics														
number of children	2.598	0.863	2.553	0.847	2.814	0.906	2.638	0.821	2.542	0.917	2.644	0.899	2.575	0.844
mother age	34.373	3.284	34.634	3.253	33.124	3.143	34.886	3.250	33.644	3.193	33.654	3.124	34.735	3.304
single	0.413	0.492	0.387	0.487	0.541	0.499	0.000	0.000	1.000	0.000	0.649	0.477	0.295	0.456
not married	0.259	0.438	0.256	0.436	0.273	0.446	0.000	0.000	0.627	0.484	0.305	0.460	0.236	0.425
never married	0.154	0.361	0.131	0.337	0.268	0.443	0.000	0.000	0.373	0.484	0.344	0.475	0.059	0.235
teen mother	0.264	0.441	0.218	0.413	0.486	0.500	0.197	0.398	0.360	0.480	0.383	0.486	0.205	0.404
total family income	43863	237202	48288	259892	22172	20502	51506	44409	33033	364738	27054	34913	52167	288539
highest grade complet	12.299	2.122	12.950	1.494	9.176	1.896	12.476	2.197	12.046	1.982	12.391	1.762	12.252	2.280
mother high school drc	0.173	0.378	0.000	0.000	1.000	0.000	0.135	0.342	0.226	0.418	0.172	0.377	0.173	0.378
mother high school gra	0.615	0.487	0.743	0.437	0.000	0.000	0.633	0.482	0.590	0.492	0.614	0.487	0.616	0.486
mother has some colle	0.128	0.335	0.155	0.362	0.000	0.000	0.126	0.332	0.132	0.339	0.149	0.356	0.118	0.323
mother has college de	0.084	0.278	0.102	0.302	0.000	0.000	0.106	0.309	0.052	0.223	0.066	0.248	0.093	0.291
AFQT score	31.899	25.429	36.023	25.380	11.680	12.908	37.279	26.634	24.317	21.450	19.525	17.421	38.254	26.531
maternal grandmother	0.526	0.499	0.549	0.498	0.411	0.492	0.522	0.500	0.532	0.499	0.597	0.491	0.491	0.500

Table 4: Relationship Between Supervision and Adolescent Behavior

	All		No Supervision		Supervision	
All chidren	**mean**	**std. Dev.**	**mean**	**std. Dev.**	**mean**	**std. Dev.**
Skip	0.078	0.268	0.094	0.292	0.073	0.260
Drunk/high	0.046	0.209	0.068	0.251	0.039	0.193
Steal	0.119	0.324	0.149	0.356	0.109	0.312
Hurt	0.198	0.399	0.220	0.414	0.191	0.393
Observations	6433					
<HS						
Skip	0.137	0.344	0.166	0.373	0.132	0.338
Drunk/high	0.064	0.246	0.103	0.306	0.057	0.233
Steal	0.171	0.376	0.254	0.437	0.155	0.362
Hurt	0.227	0.419	0.291	0.456	0.215	0.411
Observations	1110					
>=HS						
Skip	0.066	0.248	0.085	0.279	0.059	0.235
Drunk/high	0.042	0.201	0.063	0.244	0.035	0.183
Steal	0.108	0.311	0.136	0.343	0.098	0.297
Hurt	0.192	0.394	0.211	0.408	0.185	0.389
Observations	5323					
Married						
Skip	0.057	0.232	0.076	0.265	0.051	0.220
Drunk/high	0.034	0.181	0.054	0.226	0.023	0.164
Steal	0.093	0.290	0.107	0.309	0.088	0.284
Hurt	0.177	0.381	0.205	0.404	0.167	0.373
observations	2854					
Single						
Skip	0.108	0.310	0.104	0.306	0.118	0.323
Drunk/high	0.063	0.244	0.055	0.228	0.088	0.284
Steal	0.156	0.363	0.139	0.346	0.207	0.405
Hurt	0.229	0.420	0.225	0.418	0.240	0.427
observations	2658					

Table 5: Relationship Between Work and Supervision, by Education of Mother, Marital Status and Race

	probability of work		supervision if work		supervision if no work	
	mean	**std dev**	**mean**	**std dev**	**mean**	**std dev**
All Children	0.773	0.419	0.701	0.458	0.93	0.254
>=HS	0.808	0.394	0.686	0.464	0.948	0.241
< HS	0.606	0.489	0.796	0.403	0.913	0.282
Married	0.804	0.397	0.709	0.454	0.947	0.224
Single	0.73	0.444	0.688	0.463	0.914	0.281
Non-Black	0.787	0.409	0.692	0.462	0.932	0.252
Black	0.746	0.435	0.719	0.45	0.929	0.258

Table 6: OLS, FE and IV Estimates, Income Excluded

	OLS	FE	IV	OLS	FE	IV	OLS	FE	IV	OLS	FE	IV
	skip	**skip**	**skip**	**high**	**high**	**high**	**stole**	**stole**	**stole**	**hurt**	**hurt**	**hurt**
supervision	-0.02**	-0.025**	-0.216*	-0.021***	-0.001	-0.21*	-0.043***	-0.023*	-0.348*	-0.036***	-0.033*	-0.56**
	2.430	2.250	1.720	3.040	0.150	1.920	4.340	1.710	1.950	3.230	1.960	2.590
male	0.023***	0.02*	0.024***	-0.003	-0.010	-0.002	0.046***	0.051***	0.048***	0.113***	0.12***	0.116***
	2.960	1.950	3.050	0.610	1.200	0.350	5.250	4.306	5.190	11.270	8.104	10.370
older sibling	0.025***	0.003	0.007	0.012*	-0.009	-0.006	0.024**	0.005	-0.004	0.005	-0.003	-0.043
	3.150	0.260	0.490	1.680	0.840	0.450	2.290	0.328	0.200	0.360	0.149	1.640
teen mother	0.010		0.020	0.025***		0.034***	0.002		0.017	-0.004		0.022
	0.920		1.480	2.710		2.860	0.160		1.080	0.250		1.060
black	-0.009		-0.004	-0.026***		-0.023**	0.026**		0.033**	0.019		0.032*
	0.800		0.310	2.700		2.290	2.040		2.270	1.330		1.850
hispanic	0.017		0.011	-0.029**		-0.034***	0.033**		0.023	0.009		-0.005
	1.480		0.830	2.550		2.730	2.560		1.490	0.620		0.310
single	0.039**	0.019	0.028	-0.006	-0.011	-0.016	0.036*	0.010	0.018	0.045**	0.018	0.014
	2.420	0.668	1.530	0.450	0.466	1.130	1.860	0.314	0.900	2.330	0.428	0.520
Mother high school drop out	0.032*		0.052**	0.026*		0.044**	0.033		0.063**	0.037		0.09**
	1.780		2.440	1.680		2.050	1.620		2.430	1.430		2.290
Mother has high school degree or	-0.002		0.003	0.017		0.022	0.007		0.015	0.021		0.036
some college	0.190		0.200	1.620		1.600	0.480		0.920	1.000		1.220
AFQT score	-0.001***		-0.001***	-0.001		-0.001	-0.001***		-0.001***	-0.001		-0.001**
	3.010		2.960	0.200		1.380	3.380		3.000	1.030		2.230
maternal grandmother worked	-0.011		-0.019**	-0.002		-0.009	-0.002		-0.014	-0.002		-0.023*
	1.580		2.030	0.410		1.280	0.200		1.300	0.210		1.790
Observations	6411	6411	6411	5902	5902	5902	6393	6393	6393	6400	6400	6400
Number of families		2258			2118			2259			2258	
R-squared	0.06	0.03		0.08	0.07		0.06	0.03		0.04	0.03	

Robust t-statistics below estimates

Also included: child age in years (separate dummy variables), number of siblings, AFDC caseloads, state per capita wage income, whether child lives in central city, non-central city or rural area, state and year dummies

*significant at 10%; ** significant at 5% level; *** significant at 1% level

Table 7: First Stage Regressions, Income Excluded

	skip supervision	high supervision	stole supervision	hurt supervision
employment/population	-0.066*	-0.081*	-0.07*	-0.066*
	1.659	1.899	1.74	1.661
child care subsidy per child<14	0.328**	0.344	0.323	0.322
(*1000)	2.075	2.114	2.041	2.033
child care subsidy*married	0.137*	0.142*	0.134*	0.143**
(*1000)	1.998	1.986	1.957	2.088
preschool sibling	0.029*	0.033**	0.028*	0.029*
	1.993	2.023	1.834	1.879
Head Start/PreK funding per child<5	-0.008	-0.005	-0.01	-0.009
(*1000)	0.6	0.325	0.72	0.684
Head Start/PreK* Single	0.024*	0.022	0.025*	0.026**
(*1000)	1.889	1.652	1.953	2.256
Observations	6411	5902	6393	6400
R-squared	0.06	0.06	0.06	0.06

Robust t-statistics below estimates

*significant at 10%; ** significant at 5% level; *** significant at 1% level

Table 8: First Stage Regressions Stratified by Marital Status, Maternal Education, Race, Gender and Age

	married	single	>=HS	<HS	non-black	black	female	male	age 9-12	age 13-14
employment/population	-0.035	-0.123	-0.042	-0.14	-0.036	-0.116*	-0.043	-0.079	-0.046	-0.08
	0.77	1.37	0.94	1.31	0.66	1.85	0.78	1.26	0.906	1.067
preschool sibling	0.045**	0.058**	0.047***	0.07*	0.07***	0.014	0.036	0.062***	0.049	0.056*
	2.24	2.24	2.56	1.85	3.36	0.56	1.67	2.77	2.576	1.986
child care subsidy per child<14	0.438***	0.257	0.457***	0.125	0.571***	0.087	0.348**	0.399*	0.122	0.736
(*1000)	2.45	1.05	2.83	0.31	2.83	0.42	2.19	1.99	0.631	3.395
Head Start/PreK funding per child<5	-0.023*	0.043***	0	0.026	0.005	0.003	-0.001	0.006	0.0013	-0.002
(*1000)	1.72	2.94	0.01	1.01	0.28	0.18	0.09	0.44	0.082	0.16
AFDC/TANF child care subsidy per child<14	-0.034	-0.041	-0.039	0.027	-0.051	0	-0.028	-0.043	-0.046	0.014
*1000	1.01	1.04	1.54	0.56	1.51	0	0.79	1.23	1.392	0.346
Observations	3772	2639	5310	1101	4280	2131	3220	3191	4035	2373
R-squared	0.06	0.10	0.06	0.10	0.07	0.09	0.07	0.07	0.05	0.09

Robust t-statistics below estimates

*significant at 10%; ** significant at 5% level; *** significant at 1% level

Appendix Table 1: OLS, FE and IV Estimates, Income Included

	OLS skip	FE skip	IV skip	OLS high	FE high	IV high	OLS stole	FE stole	IV stole	OLS hurt	FE hurt	IV hurt
supervision	-0.023 ***	-0.023**	-0.170	-0.023***	-0.001	-0.195*	-0.044***	-0.027*	-0.402**	-0.031***	-0.023	-0.635***
	2.630	1.990	1.270	3.180	0.140	1.710	4.350	1.960	2.090	2.770	1.360	2.860
log total family income	-0.01**	0.007	-0.017**	0.000	-0.003	-0.009	-0.018	0.101	-0.035***	-0.015*	0.006	-0.043***
	2.050	0.690	2.230	0.090	0.340	1.160	2.570	0.927	3.210	1.800	0.400	3.330
male	0.022***	0.023**	0.023***	-0.004	-0.007	-0.004	0.045***	0.059***	0.047***	0.116***	0.13***	0.119***
	2.780	2.190	2.830	-0.880	0.862	0.670	5.150	4.993	4.980	11.540	8.966	10.190
older sibling	0.026***	0.009	0.013	0.013*	0.008	-0.003	0.027**	0.011	-0.006	0.008	-0.003	-0.046*
	3.190	0.680	0.880	1.820	0.800	0.250	2.340	0.715	0.290	0.600	0.174	1.710
teen mother	0.008		0.014	0.028***		0.036***	-0.003		0.012	-0.002		0.024
	0.680		1.060	2.880		2.960	0.230		0.690	0.150		1.120
black	-0.014		-0.011	-0.028***		-0.027***	0.015		0.021	0.016		0.027
	1.200		0.910	2.770		2.610	1.190		1.430	1.070		1.420
hispanic	0.02*		0.016	-0.028**		-0.033**	0.029**		0.017	0.008		-0.009
	1.730		1.190	2.280		2.510	2.170		1.050	0.570		0.510
single	0.042**		0.030	-0.006		-0.021	0.036*		0.005	0.044**		-0.007
	2.490		1.460	-0.400		1.200	1.740		0.200	2.220		0.220
Mother high school drop out	0.020		0.032	0.024		0.036*	0.015		0.043	0.031		0.078*
	1.100		1.580	-1.430		1.730	0.700		1.630	1.140		1.950
Mother has high school degree or	-0.009		-0.007	0.015		0.017	-0.002		0.002	0.020		0.027
some college	0.650		0.450	1.420		1.310	0.130		0.130	0.880		0.880
AFQT score	-0.001***		-0.001***	0.000		0.000	-0.001***		-0.001***	0.000		-0.001*
	2.830		2.650	0.710		1.520	3.380		3.090	0.530		1.750
maternal grandmother worked	-0.009		-0.015	-0.001		-0.008	0.001		-0.014	-0.003		-0.027*
	1.260		1.610	0.200		1.030	0.070		1.170	0.260		1.900
Observations	6006	6006	6006	5517	5517	5517	5990	5990	5990	5998	5998	5998
Number of families		2167			2023			2168			2168	
R-squared	0.06	0.03	0.01	0.08	0.07		0.06	0.04		0.05	0.03	

Robust t-statistics below coefficient estimates

*significant at 10%; ** significant at 5% level; *** significant at 1% level

Appendix Table 2: First Stage Regressions, Income Included

	skip supervision	high supervision	stole supervision	hurt supervision
employment/population	-0.058	-0.078*	-0.062	-0.058
	1.347	1.758	1.454	1.356
child care subsidy per child<14	0.298**	0.303*	0.293*	0.293*
(*1000)	1.856	1.704	1.82	1.83
child care subsidy*married	0.158***	0.163***	0.154**	0.165***
(*1000)	2.241	2.27	2.187	2.324
preschool sibling	0.028*	0.033*	0.026	0.027
	1.717	1.955	1.546	1.655
Head Start/PreK funding per child<5	-0.014	-0.011	-0.015	-0.015
(*1000)	1.026	0.85	1.136	1.108
Head Start/PreK* Single	0.025*	0.023*	0.026*	0.027**
(*1000)	1.883	1.684	1.964	2.015
Observations	6006	5517	5990	5998
R-squared	0.07	0.07	0.07	0.07

Robust t-statistics below coefficient estimates

*significant at 10%; ** significant at 5% level; *** significant at 1% level