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Home alone: supervision after school and child behavior

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Abstract

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 has impeded the ability of many working mothers to find sufficient child care for their children. As a result, as recently as 1998 over eight million children ages five to 14 spent time without adult supervision on a regular basis in the US. I examine the effect of the lack of adult supervision after school on a panel of school-age children using ordinary least squares and fixed effect estimation. I find that children with adult supervision are less likely to skip school, use alcohol or marijuana, steal something or hurt someone. These findings suggest that expanding after school or child care programs typically geared to preschool-age children to accommodate more school-age children may have important consequences for their human capital development and labor market outcomes later in life.

JEL classification: J13
Keywords: Children; Supervision

1. Introduction

The latter half of the twentieth 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

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percent in 1950. 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 1998, 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 66 to 78 percent, further increasing the need for child care among low-income mothers (Schoeni and Blank, 2000).

Due in part to the high cost of child care, working mothers may be unable to afford sufficient child care for their children. The child care policy debate has focused on increasing low-income mothers' access to child care for their preschool children, with less attention paid to the child care needs of older children. However, in 1998 an estimated eight million children ages five to 14 spent time without adult supervision on a regular basis in the US, half of whom were 13 and 14 year olds, suggesting that the child care needs of school-age children are largely unmet (Miller, 1999). Left unsupervised, school-age children may be more likely to engage in antisocial or risky, potentially dangerous behavior. There is 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). In addition, 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 school-age children (Fox and Newman, 1997; Office of Juvenile Justice and Delinquency Prevention, 1996).

The focus of the present research is to estimate the impact of adult supervision after school on child behavior, including school truancy, relatively minor criminal activity such as stealing, alcohol or drug use, and hurting someone. Three factors distinguish this paper from previous research. First, the focus of this work is children age 10 to 14—an age group that has been largely unstudied in the child care literature. 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 labor market (Heckman et al., 2000), and (2) the link between adult supervision and youth 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 effects 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.

The rest of the paper is organized as follows. Section 2 presents existing empirical work on the effect of parental time on child outcomes, Section 3 outlines the estimation strategy and describes the data, Section 4 presents the empirical results, and Section 5 concludes with a brief discussion of the policy implications.

2. Background

2.1. Existing research on the effect of time inputs on child outcomes

Much of the previous empirical research on the effect of parental or adult time inputs on child behavior 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 measure (such as child scores on the Peabody Picture and Vocabulary Test, or PPVT, reading comprehension and math exams). Many of these analyses are based on 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]

In addition to the dearth of analyses of the effect of maternal employment on outcomes of school-age children, 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 important 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 and youth 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 4000 ninth graders and compared mean scores for substance use, risk taking, grades and depressed mood by type of after school care and find that youths who were not supervised by adults after school had significantly greater problem behavior than those who were. However, the authors find that this effect is mitigated if parents consistently monitor the adolescents' whereabouts. Jenkins (1996) likewise found that eighth graders in Ohio who participated in adult-supervised after

[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-Loury (1988) found a positive effect of maternal time on the educational attainment of 20–26 year olds for highly 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.

school activities used drugs significantly less often than those not involved in such activities.

Sociologists and developmental psychologists have also investigated the relationship between self-care and adolescent behavior. The results in this literature are more mixed. 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. 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 youth outcomes, thereby affecting our ability to draw causal inferences regarding the effect of self-care on youth 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.

2.2. Modes of child care for school-age children

Employed mothers use a variety of afterschool child care arrangements for children age five to 14, the most common of which (apart from paternal care) appears to be in-home care by a non-parent. According to information from the 1995 Survey of Income and Program Participation (SIPP), 19.4 percent of children age five to 14 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 the home of a non-coresiding relative, non-relative or family day care provider and 7.8 percent are cared for in an organized care facility (Green Book, 2000). Twelve percent of children age five to 14 are in self-care. Within this group of school-age children, the proportion of children in self-care likely increases with age, which would be consistent with the higher levels of self-care (25 percent) reported in this analysis sample of 10 to 14 year olds.

3. Estimation and data

3.1. Estimation strategy

The theoretical model underlying the estimation is that developed by Becker and Tomes (1976). 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 a function of market inputs and parental time devoted to child care.

The measures of child quality (the outcomes of interest) in this analysis are antisocial or risky child 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 ith child at time t is as follows:

$$Y = \beta_0 + \beta_1 Supervision + \beta_2 Inc. + \beta_3 X^c + \beta_4 X^m + \beta_5 X^s + \beta_6 Year + \beta_7 State + \varepsilon. \quad (1)$$

In this equation Y is an indicator equal to one if the child 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.[3] *Inc*. in the above equation refers to annual family income. A vector of child-specific factors (X^c) includes age, birth order (dummies for whether first or second born), gender, the number of siblings less than 19 in the family, and whether the child lives in a central or non-central city. The vector X^m consists of mother-specific variables including her current age, age at first birth (whether a teen mother), marital status, AFQT score (a measure of cognitive ability), whether her mother worked when she was 14 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.

I include a vector of state level time-varying controls represented by X^s in the above equation. The vector X^s includes the log of the maximum AFDC/TANF benefit for a family of three in the state, a welfare reform indicator (set to 1 for every year during and after the state implemented a waiver to reform its welfare system or TANF), and state per capita wage income.[4] Finally, vectors of state and year dummies, denoted by *State* and *Year* in the above equation, are also included. Eq. (1) was estimated using a linear probability regression both with and without a family fixed effect.[5]

To account for the fact that the decision to supervise school-age children 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 employ a family

[3] Children who report that they do not go home but go to day care, an after school program, or the home of a relative after school were also considered to be supervised for the purposes of this analysis. The results are not sensitive to the inclusion of this group.

[4] Data on welfare benefits were obtained from the Green Books and the Urban Institute's state welfare reform database for the most recent years. Data on the implementation of state welfare reform was gathered from the Council of Economic Advisors and the Urban Institute Welfare Rules database.

[5] A linear probability model was selected over probit or logit models because it requires less restrictive assumptions regarding the distribution of the error term. I also estimated using a probit model. In this case, the estimated effect of supervision (calculated at the sample means) was very similar to that obtained from the linear probability models.

fixed effect. The family fixed effect enables one 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 be more willing to leave their children unsupervised, confident 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. However, if the decision to allocate time to certain children *within the family* is correlated with the child's propensity to engage in negative behavior, then the estimates from regressions with the family fixed effect may also be biased. I address this concern in the next section by examining the time allocation decision both across and within families to assess whether mothers allocate time to children based on characteristics that may predispose them to problem behavior.

3.2. Data

The data used are the 1998 wave of the National Longitudinal Survey of Youth Child–Mother file (NLSY-CM). The NLSY is a cohort of 12,686 men and women age 14 to 21 as of December, 1978. The original NLSY survey design over-sampled blacks, Hispanics and economically disadvantaged poor whites.[6] 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 disadvantages of the NLSY include the relatively small sample size, potential cohort effects, and the fact that children of the original cohort who are ages 10 to 14 were born to the youngest mothers in the sample. Though I include controls for the current age of the mother and the child as well as whether she was a teen mother, when interpreting the results, one should keep in mind that this sample is unrepresentative of the population of school-age children, that these children are at greater risk of engagement in each of these behaviors and thus the results not necessarily generalizable. The standard errors are adjusted to reflect autocorrelation within families. In addition, because of the non-random nature of the sample, weights were used for all analyses.[7]

[6] The original sample included 6111 youths taken from a cross-section and an additional 1480 Hispanic youths, 2172 black youths, 1643 disadvantaged whites and 1280 military personnel. Because the disadvantaged whites and military samples were discontinued, the final analysis sample is drawn from the remaining 9763 youths.

[7] MaCurdy et al. (1998) note that because of the discontinuation of some of the sub-samples as well as the initial attrition of some sample members and non-random re-entry at later dates, the original weights may no longer be appropriate. The Center for Human Resources Research at Ohio State University has re-calculated the weights based on the recommendations of MaCurdy et al. (1998). The analyses presented here were run three times: unweighted, with the NLSY child weights, and with the new weights as specified by MaCurdy, Mroz and Gritz. The unweighted results differed from the two weighted analyses. The two weighted analyses, however, were very similar, suggesting that analysis based on the original NLSY weights is appropriate.

Table 1
Variable means by maternal education and marital status-weighted

	All	HS graduate	HS drop out	Married	Single
Adult supervision after school	0.75	0.72	0.85	0.75	0.75
Child behavior					
Any of the behaviors	0.32	0.30	0.40	0.28	0.38
Skip school	0.09	0.08	0.16	0.07	0.13
Get drunk/high	0.06	0.05	0.07	0.04	0.08
Steal something	0.14	0.12	0.20	0.10	0.179
Hurt someone	0.21	0.20	0.25	0.19	0.24
Child characteristics					
Age	11.98	11.96	12.06	11.99	11.96
	(0.017)	(0.019)	(0.040)	(0.023)	(0.026)
Older sibling present	0.43	0.42	0.52	0.42	0.45
Preschool-age sibling present	0.18	0.17	0.23	0.17	0.19
Number of children	2.79	2.71	3.26	2.79	2.79
	(0.016)	(0.016)	(0.053)	(0.020)	(0.029)
Maternal/family characteristics					
Black	0.18	0.17	0.25	0.09	0.36
Hispanic	0.08	0.07	0.17	0.07	0.09
Maternal age	35.11	35.41	33.41	35.54	34.26
	(0.045)	(0.049)	(0.095)	(0.058)	(0.067)
Single	0.33	0.31	0.49		
Teen mother	0.24	0.19	0.53	0.19	0.35
Total family income	$47,970	$51,857	$25,466	$56,112	$31,639
	(3636)	(4366)	(753)	(852)	(9665)
Maternal education	12.40	13.00	9.33	12.64	12.09
	(0.028)	(0.024)	(0.052)	(0.037)	(0.039)
AFQT score	40.35	44.83	13.80	45.16	30.77
	(0.370)	(0.395)	(0.441)	(0.491)	(0.500)
Maternal grandmother worked	0.53	0.54	0.45	0.53	0.53
Number of children	3726	2962	764	2195	1531
Number of families	2161	1778	383	1343	818
Observations	5838	4667	1171	3344	2494

Standard errors below in parentheses.

Data on adolescent behavior and adult supervision is gathered as part of the child/young adult questionnaire of the NLSY administered in even years starting in 1986. Questions in the survey with respect to supervision and adolescent behavior (skipping school, getting drunk/high, stealing something, and hurting someone) refer to the year prior to the date of interview. Supervision questions were first asked in 1988 and asked consistently through 1998. I focus on children age 10 to 14, rather than their younger or older siblings because this is the only age group for whom information on adult supervision is consistently collected.[8] The final analysis sample consists of 3726 children age 10 to 14 born to 2161 mothers, for a total of 5838 observations.

[8] After 1994, children 15 years of age and older were no longer asked questions about supervision.

Table 2
Probability of outcome, by supervision and maternal characteristics

	Whole sample		HS graduate		HS drop out		Married		Single	
	Supervised	Not supervised	Supervised	Not supervised	Supervised	Not supervised	Supervised	Not supervised	Supervised	Not supervised
Any of the behaviors	0.306	0.37***	0.282	0.357***	0.387	0.461*	0.06	0.089***	0.369	0.422**
Skip school	0.089	0.107**	0.069	0.094***	0.156	0.205	0.031	0.061***	0.128	0.132
Get drunk/high	0.048	0.075***	0.043	0.07***	0.066	0.113**	0.031	0.061***	0.072	0.095*
Steal something	0.128	0.156***	0.109	0.143***	0.192	0.249*	0.036	0.117*	0.17	0.208**
Hurt someone	0.205	0.229**	0.194	0.222**	0.24	0.28	0.179	0.214**	0.239	0.249
Observations	4362	1476	3371	1296	991	180	2499	845	1863	631

*** Difference significant at 0.01; **difference significant at 0.05; *difference significant at 0.10.

Table 3
Probability of outcome given supervision, whole sample and within-family means

	Whole sample		Within family	
	Supervised	Not Supervised	Supervised	Not Supervised
Any of the behaviors	0.306	0.370***	0.301	0.383***
Skip school	0.089	0.107**	0.084	0.122***
Get drunk/high	0.048	0.075***	0.051	0.065
Steal something	0.128	0.156***	0.127	0.160**
Hurt someone	0.205	0.229**	0.200	0.240**

The first two columns are identical to the second and third columns of the first panel of Table 2 and are included here for comparison purposes.

The probability of adult supervision after school varies by maternal characteristics, as does the likelihood of engaging in each of the behaviors (Table 1). Seventy-five percent of all children ages 10 to 14 report that an adult is usually present when the child returns from school. Children of mothers without a high school degree are more likely to be supervised (85 percent). This may reflect the fact that women without a high school degree are less likely to work (or less likely to work full time), or more likely to be on welfare and therefore more likely to be at home when their children return from school. Thirty-two percent of all children report engaging in any of the behaviors. Children born of mothers without a high school degree are more likely to engage in each of the behaviors relative to those whose mothers have a high school degree or more. This pattern holds for single versus married mothers as well.

This pattern of supervision and child behavior in the raw data might suggest that supervision is positively correlated with antisocial behavior: children born to mothers without a high school degree are more likely to be supervised and more likely to engage in each of the behaviors. However, stratifying by marital status or maternal education shows a strong negative correlation between engagement in each of these activities and supervision (Table 2). That is, for each subgroup of women presented in Table 2, the probability of engaging in each of the behaviors decreases significantly if the child is supervised by an adult. For mothers without a high school degree, for example, the probability of engaging in any of the behaviors increases from 0.387 to 0.461 without supervision. While the probabilities presented in Table 2 are based on the whole sample, the last two columns of Table 3 present the probabilities of engaging in each of the

Table 4
Probability of supervision given characteristics predisposing to problem behaviors, whole sample and within-family means

	Whole sample		Within family	
	With characteristic	W/out characteristic	With characteristic	W/out characteristic
Low birth weight	0.76**	0.748	0.723	0.752
Early birth	0.744	0.752	0.753	0.749
BPI above median	0.75	0.752	0.75	0.748
BPI above 75%	0.764	0.743	0.756	0.748
Suspended from school in past	0.729	0.742	0.753	0.749

Table 5
OLS and FE regressions

	Any of the behaviors		Skip school		Get drunk/high		Steal something		Hurt someone	
	OLS	FE	OLS	FE	OLS	FE	OLS	FE	OLS	FE
Adult supervision after school	− 0.075	− 0.067	− 0.011	− 0.029	− 0.018	− 0.003	− 0.035	− 0.028	− 0.041	− 0.035
	[0.018]	[0.020]	[0.009]	[0.013]	[0.009]	[0.011]	[0.012]	[0.015]	[0.014]	[0.018]
Child characteristics										
Male	0.108	0.13	0.011	0.029	− 0.008	− 0.008	0.03	0.065	0.123	0.151
	[0.015]	[0.017]	[0.009]	[0.011]	[0.008]	[0.009]	[0.009]	[0.013]	[0.013]	[0.016]
Child age 11	− 0.088	− 0.086	− 0.113	− 0.107	− 0.159	− 0.137	− 0.013	− 0.021	0.027	0.023
	[0.046]	[0.043]	[0.033]	[0.027]	[0.030]	[0.024]	[0.029]	[0.032]	[0.034]	[0.039]
Child age 12	− 0.068	− 0.063	− 0.112	− 0.116	− 0.145	− 0.126	− 0.014	− 0.016	0.044	0.046
	[0.045]	[0.041]	[0.033]	[0.027]	[0.030]	[0.023]	[0.030]	[0.031]	[0.035]	[0.038]
Child age 13	− 0.021	− 0.025	− 0.088	− 0.082	− 0.122	− 0.103	0.012	0.006	0.054	0.039
	[0.045]	[0.038]	[0.032]	[0.025]	[0.030]	[0.022]	[0.028]	[0.029]	[0.034]	[0.035]
Child age 14	0.042	0.036	− 0.033	− 0.033	− 0.036	− 0.029	0.055	0.05	0.048	0.035
	[0.042]	[0.040]	[0.033]	[0.026]	[0.032]	[0.022]	[0.030]	[0.030]	[0.033]	[0.036]
First born	− 0.051	− 0.003	− 0.072	− 0.028	− 0.038	− 0.015	− 0.076	− 0.042	0.015	0.031
	[0.031]	[0.040]	[0.018]	[0.026]	[0.015]	[0.022]	[0.019]	[0.030]	[0.028]	[0.037]
Second born	− 0.043	− 0.003	− 0.043	− 0.006	− 0.022	− 0.005	− 0.059	− 0.037	− 0.001	0.021
	[0.028]	[0.028]	[0.018]	[0.018]	[0.013]	[0.015]	[0.019]	[0.021]	[0.024]	[0.025]
Maternal/family characteristics										
Log (total family income)	− 0.019	− 0.004	− 0.016	0.011	− 0.007	0.003	− 0.016	− 0.018	− 0.004	− 0.012
	[0.011]	[0.018]	[0.007]	[0.011]	[0.007]	[0.010]	[0.008]	[0.013]	[0.010]	[0.016]

Teen mother	0.048		0.028		0.029		0.02		0.01	
	[0.020]		[0.014]		[0.013]		[0.016]		[0.018]	
Black	− 0.017		− 0.008		− 0.042		0.005		0	
	[0.022]		[0.013]		[0.013]		[0.014]		[0.019]	
Hispanic	− 0.006		0.02		− 0.043		0.028		− 0.008	
	[0.019]		[0.018]		[0.016]		[0.019]		[0.015]	
Single	0.09	0.044	0.038	0.019	0.044	0.042	0.05	0.049	0.055	0.008
	[0.018]	[0.033]	[0.013]	[0.021]	[0.010]	[0.018]	[0.014]	[0.024]	[0.017]	[0.030]
Maternal age	− 0.008	0.016	− 0.002	0.004	− 0.001	− 0.043	− 0.002	0.006	− 0.007	0.011
	[0.004]	[0.008]	[0.002]	[0.005]	[0.002]	[0.025]	[0.003]	[0.006]	[0.004]	[0.007]
HS drop out	0.093		0.036		0.038		0.044		0.079	
	[0.036]		[0.021]		[0.022]		[0.027]		[0.034]	
HS graduate	0.054		− 0.009		0.026		0.004		0.049	
	[0.029]		[0.012]		[0.012]		[0.017]		[0.027]	
AFQT score	− 0.001		− 0.001		− 0.001		− 0.001		− 0.001	
	[0.000]		[0.000]		[0.000]		[0.000]		[0.000]	
Maternal grandmother worked	− 0.014		− 0.006		0.002		0.001		− 0.005	
	[0.016]		[0.008]		[0.008]		[0.010]		[0.013]	
Observations	5838	5838	5697	5698	5287	5288	5679	5680	5695	5696
R-squared	0.09	0.04	0.09	0.03	0.1	0.05	0.08	0.03	0.06	0.03
Number of families		2161		2140		2031		2140		2141
Results excluding family income as a covariate										
Adult supervision after school	− 0.072	− 0.068	− 0.009	− 0.028	− 0.017	− 0.003	− 0.033	− 0.028	− 0.041	− 0.034
	[0.018]	[0.020]	[0.009]	[0.013]	[0.009]	[0.011]	[0.012]	[0.015]	[0.014]	[0.018]
R-squared	0.086	0.042	0.085	0.028	0.103	0.052	0.081	0.028	0.059	0.033

Robust standard errors in brackets.

behaviors by supervision status *within* family. These probabilities suggest that, even within the same family, when children are supervised they are less likely to engage in each of the behaviors relative to periods during which they are unsupervised or to their unsupervised siblings (30 versus 38 percent). The differences are significant for all outcomes except getting drunk/high within family.

As noted previously, the family fixed effect purges estimates of the effect of supervision of endogeneity bias only if parents do not allocate time disproportionately within the family to problem children. To address this concern, I report the probability of supervision given certain traits predisposing to or suggesting problem behavior for the whole sample and within family in Table 4. The child characteristics predisposing to problem behavior include low birth weight (LBW), an early or premature birth, the child's score on the Behavioral Problem Index (BPI), and whether the child reported being suspended from school in the past.[9] The BPI is an index of problem behavior that is based on maternal assessments of her child's behavior and thus differs from the outcome variables which are based on child reports. A comparison of columns one and two of Table 4 suggests that LBW school-age children are significantly more likely to be supervised. There is no significant relationship between supervision and whether the child was born early, reported being suspended from school or is considered by his or her mother to be predisposed to problem behavior (as measured by the BPI). The last two columns of Table 4 present the same probabilities, but within family. Within family, there is no clear pattern or significant differences in the supervision of children based on characteristics predisposing to problem behavior. The difference based on LBW is no longer significant and even changes direction. These comparisons support the use of within-family variation to identify the impact of adult supervision on the behavior of school-age children.

4. Regression results

In OLS regressions, supervision has a negative and significant effect on all outcomes except skipping school (for which the effect is negative but insignificant). For engaging in any of the four behaviors, supervision has a negative and significant effect of -0.075 (representing a 7.5 percentage point decrease). Among the three individual behaviors for which the impact of supervision is significant, the effect ranges from -0.018 for getting high/drunk, to -0.035 for stealing something and -0.041 for hurting someone (Table 5).

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 engage in any of the behaviors, especially stealing something or hurting someone. Older children are also more likely to engage in each of these behaviors. Among maternal characteristics, those that appear to consistently

[9] The findings of Norberg (1998) suggest that the mothers of high risk babies are 50% less likely to work in the child's first five years of life, relative to mothers of healthier children.

affect risky or anti-social behavior are having less than a high school degree (positive effect) and AFQT score (negative effect). These maternal characteristics may reflect poorer parenting skills.

Results with a family fixed effect (Table 5) are similar, though slightly smaller, than those without for engaging in any of the behaviors, stealing something or hurting someone. For engaging in any of the behaviors, the negative effect of supervision changes from -0.075 to -0.067, for stealing something from -0.035 to -0.028 and for hurting someone from -0.041 to -0.035. For skipping school and getting high or drunk, the impact of supervision does change upon inclusion of a family fixed effect: the effect of supervision on skipping school doubles to -0.029 and becomes significant while the effect of supervision on getting drunk/high decreases and becomes insignificant. The overall similarity of the OLS and FE results provides further evidence that any unobserved maternal characteristics correlated with both the supervision decision and adolescent behavior (such as parental permissiveness or parenting skills) are minimal.[10]

The relationship between family income and child behavioral outcomes in this context is noteworthy. Family income is consistently and negatively correlated with engaging in any of the behaviors, skipping school or stealing something in the OLS regressions. However, in the family fixed effect regressions income has no significant effect on any of the behaviors, most likely due to the large degree of serial correlation in family income. At the bottom of Table 5, I present the same coefficient estimates but based on regressions that exclude family income. The resulting coefficient estimates of the impact of supervision on behavior are strikingly similar to those with income controls. These results suggest that income does not mitigate the lack of adult supervision and are consistent with those put forth by others, such as Mayer (1997), which suggest that the effect of income on child outcomes is relatively small once other family characteristics and behavior are fully considered.

5. Discussion

Adult supervision of school-age children is associated with a decrease in risky or anti-social behavior such as skipping school, using alcohol or drugs, stealing something or 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. These findings have direct implications for child care policies. Historically, the focus of child care subsidy programs has been mothers with preschool-age children, for obvious reasons, despite the high levels of self-care reported for school-age children. However, these findings suggest that the focus should be expanded to include older children who stand to gain considerably from greater adult supervision in the after school hours.

[10] State fixed effects are not included in the family fixed effects regressions because very few families move across states in the sample. An F statistic testing the exclusion of the state FE is 0.81 (38,3577) with an associated P value of 0.792.

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References

Becker, G., Tomes, N., 1976. Child endowments and the quantity and quality of children. Journal of Political Economy 84 (4), 1153–1189.

Blau, F., Grossberg, A., 1992. Maternal labor supply and children's cognitive development. Review of Economics and Statistics 74 (3), 474–481.

Committee on Ways and Means, U.S. House of Representatives, 2001. 2000 Green Book. U.S. Government Printing Office, Washington, DC.

Datcher-Loury, L., 1988. Effects of mother's home time on children's schooling. The Review of Economics and Statistics 70 (3), 367–373.

Dwyer, K.M., Richardon, J.L., Daley, K.L. et. al., 1990. Characteristics of eighth grade students who initiate self care in elementary and junior High School. Pediatrics 86, 448–454.

Fox, J.A., Newman, S.A., 1997. After-school crime or after-school programs? Fight crime invest in kids. Report to the U.S. Attorney General, Washington, DC.

Galambos, N., Maggs, J., 1991. Out-of-school care of young adolescents and self-reported behavior. Developmental Psychology 27 (4), 644–655.

Heckman, J., Hsse, J., Rubenstein, Y., 2000. The GED is a 'mixed signal': the effect of cognitive and non-cognitive skills on human capital and labor market outcomes. Mimeo, University of Chicago.

Jenkins, J.E., 1996. The influence of peer affiliation and student activities on adolescent drug involvement. Adolescence 122, 297–306.

Leibowitz, A., 1977. Parental inputs and children's achievement. Journal of Human Resources 12 (2), 242–251.

MaCurdy, T., Mroz, T., Gritz, R.M., 1998. An evaluation of the national longitudinal survey of youth. Journal of Human Resources 33 (2), 345–436.

Mayer, S., 1997. What Money Can't Buy: Family Income and Children's Life Chances. Harvard University Press, Cambridge.

Miller, E., 1999. Unpublished findings. National Institute on Out-of-School Time (NIOST), Wellesley.

Neidell, M., 2000. Early parental time investments in children's human capital development: effects of time in the first year on cognitive and non-cognitive outcomes. UCLA mimeo.

Norberg, K., 1998. The effect of daycare reconsidered. NBER Working Paper No. 6769.

Office of Juvenile Justice and Delinquency Prevention, 1996. Juvenile offenders and victims: a national report. Washington, DC.

Richardson, J., Radziszewska, B., Dent, C., Flay, B., 1993. Relationship between after-school care of adolescents and substance use, risk taking, depressed mood, and academic achievement. Pediatrics 92 (1), 146–148.

Ruhm, C., 2000. Parental employment and child cognitive development. NBER Working Paper No. 7666.

Schoeni, R., Blank, R., 2000. What has welfare reform accomplished? Impacts on welfare participation, employment, income, poverty and family structure. NBER Working Paper No. 7627.

Stafford, F.P., 1987. Women's work, sibling competition, and children's school performance. The American Economic Review 77 (5), 972–980.

Steinberg, L., 1986. Latchkey children and susceptibility to peer pressure: an ecological analysis. Developmental Psychology 22, 433–439.

Vandell, D.L., Ramanan, J., 1991. Children of the national longitudinal survey of youth: choices in after-school care and child development. Developmental Psychology 27 (4), 637–643.