

Assisted Housing and the Educational Attainment of Children¹

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This paper examines the long-term effects of assisted housing on the educational attainment of children. It is based on unique data, the Panel Study of Income Dynamics (PSID)–Assisted Housing Database, in which we have matched addresses of all PSID sample members to addresses of federal and state assisted housing. Using a two-stage instrumental variable approach, the inferior educational outcomes of children who live in public housing disappear when measured characteristics are taken into account, while unmeasured characteristics have insignificant effects. We also find neither positive nor negative effects of privately owned assisted housing. These findings are similar to those on the effects of other social welfare programs. © 2000 Academic Press

The question of how assisted housing² environments affect the life chances of the children who live there is not only a significant policy issue but also fertile territory for theory building and testing and methodological experimentation. It is not widely recognized that assisted housing programs actually serve more families and nearly the same number of children as were served by AFDC in its last year of operation, and at greater public expense. Although the poor neighborhood settings of these developments seem to be ingrained in the conventional wisdom about subsidized housing, new data provide a more precise profile on exactly how bad the situation is. Overall, public housing developments are located in neighborhoods that are considerably worse than neighborhoods that contain other types of assisted housing. This is also the case when compared to the neighborhoods of welfare recipients who do not receive housing assistance. In contrast, privately owned developments that are subsidized are located in neighborhoods that are roughly comparable to those of welfare recipients without housing assistance (Newman and Schnare, 1997). Finally, most of the residents of public

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²For this research, “assisted housing” refers to public housing and privately owned developments that receive government subsidy.

housing are poor and unemployed (Newman and Schnare, 1993). To the extent that the collective socialization or contagion models of neighborhood effects (Jencks and Mayer, 1990) are correct, public housing settings are consistent with poor outcomes for children growing up there.

Despite these bleak statistics, we actually know very little about the long-term effects of assisted housing on children. Both the Gautreaux and Moving to Opportunity research primarily address contemporaneous outcomes. Very few of the nonexperimental studies even control for residence in assisted housing and the few that do rely on self-reports of assisted housing residence (e.g., Currie and Yelowitz, 2000), which have now been documented as unreliable (Shroder and Martin, 1996).

The research reported here begins to address the question of how assisted housing influences one element of the life chances of children who live there, educational attainment. There are two noteworthy features of this research. First, the dataset used, the Panel Study of Income Dynamics (PSID)–Assisted Housing Database, relies on address matches, not respondent self-reports, to identify assisted housing residents. Second, a key feature of this research is that we observe the characteristics of children’s families and receipt of housing assistance from the child’s birth to age 15. We are thus able to explore whether the duration or timing of housing assistance received during childhood affect educational attainment. The specific questions we address in this paper are: (1) Is educational attainment of children affected by whether they have *ever* lived in assisted housing? (2) Is it affected by the number of years they have lived in assisted housing? (3) Does the effect of assisted housing on educational attainment differ depending on when during childhood a child lives in assisted housing? (4) Does the impact of assisted housing on educational attainment depend on whether the development is located in a large city (500,000 or more population)? Educational attainment is measured at age 20. We use a two-stage instrumental variable approach to control for the likely selectivity bias associated with assisted housing residence.

In all four analyses, we investigate whether effects differ for two different types of housing assistance: public housing and privately owned housing with government subsidies to the owner or developer. Tenant-based housing assistance (i.e., certificates and vouchers) is excluded. We distinguish between the two types of housing assistance not only because their different tenant profiles and neighborhood conditions may lead to disparate effects, but also because tenants gain access to the two types of assisted housing in different ways. Households gain access to public housing by applying to the local Public Housing Authority (PHA), while the prospective tenant for privately owned assisted housing applies directly to the landlord or manager in much the same manner that a renter seeks an apartment in the private market. It is plausible to expect these different entry mechanisms to entail selection, and some recent research supports this contention. Newman and Schnare (1993) found evidence of a channeling effect, with the

least disadvantaged households ending up in privately owned assisted housing and the most disadvantaged in public housing. Hungerford (1996) also found that public housing spells are distinct from spells in other types of assisted housing.

The next section explores several ways housing assistance may affect children's outcomes and speculates about when in a child's development these influences might be strongest. This is followed by a discussion of methods and model specification. The main data used in the analysis, the Panel Study of Income Dynamics (PSID)–Assisted Housing Database, is described next, followed by a presentation of results. The final section discusses the key findings and suggests directions for future research.

I. HOUSING ASSISTANCE EFFECTS

Roughly speaking, there are two ways in which housing assistance could affect a child's development and subsequent educational attainment. First, to the extent that housing assistance reduces a family's rent burden, a greater portion of household resources will be available for nonshelter expenditures of potential benefit to a child's development. In this sense, housing assistance acts as a general income subsidy. Second, housing assistance entails a substantial transformation of a poor child's living environment. We address the possible effects of these two features in turn.

Families without housing assistance often devote a significant proportion of their household income to rent. In 1995, more than a third of very-low-income households spent more than 50% of their incomes for rent (U.S. Department of Housing and Urban Development, 1998). Families with housing assistance, on the other hand, pay roughly 30% of their incomes for rent, with government subsidies making up the balance.³ One might expect additional disposable income to be of benefit to children. However, there is only minimal evidence to support this view. While Meyers *et al.* (1995) found that residence in public housing was associated with greater nutritional adequacy in young children, the literature on the effects of AFDC and noncash benefit programs on children is inconclusive (Currie, 1995). Mayer (1997) argues that it is not income, but the parental characteristics associated with stable employment, that lead to better outcomes for children. Thus, to the extent that public subsidies discourage parental self-sufficiency, they could result in perverse effects on children's outcomes.

The ways in which housing assistance could potentially affect a child's living environment are extremely diverse. It is useful to distinguish among three levels: the individual dwelling unit, the development, and the surrounding neighborhood. Assisted housing units must meet federal housing quality standards, and recent

³Before 1982, which covers the period of youth observation in this study, assisted renters paid 25% of their incomes for rent.

studies confirm the expectation that housing assistance should improve the physical adequacy of a family's dwelling unit (Currie and Yelowitz, 2000; Newman and Schnare, 1993). However, there is virtually no research linking housing quality to child outcomes, and it is therefore impossible to predict how large the effects of the superior physical adequacy of assisted housing units on educational attainment, if any, would be.

Housing assistance might also reduce residential instability either because the subsidy might make it easier for the family to pay its rent, or because provisions in administrative law make it more difficult to evict families living in assisted housing. Children who move often are also likely to change schools more frequently, putting them at greater risk of grade repetition and poor academic performance (U.S. General Accounting Office, 1994). In addition, Haveman *et al.* (1991) found that the number of residential moves adversely affects the likelihood of a child graduating from high school. Unfortunately, there is no empirical work on the residential stability of children in assisted housing. Therefore, while we expect positive effects due to hypothesized greater housing stability, it is impossible to predict how large such effects might be.

Housing assistance also affects the neighborhood context in which a child grows up. Because a majority of both public housing and privately owned assisted housing is located in large developments, neighborhood effects could occur at two levels: the housing development itself, or its surrounding neighborhood.⁴ It is unclear which level matters most for children's development. Only two studies address this topic even indirectly, and both suggest that the development probably influences children more than does the neighborhood. Shlay and Holupka (1991) studied Baltimore public housing and reported that the orbit of activity for children living there is confined to the development itself and venturing out into the neighborhood is rare. Newman and Harkness (1999) found that living in public housing itself—not features of the surrounding neighborhood—is what matters for educational attainment. It may be difficult to disentangle the effects of the development from the neighborhood, however, because characteristics of the development and its neighborhood are closely correlated for much of assisted housing, with public housing ranking worst on both counts. Newman and Schnare (1997) found that 43% of units in family public housing developments⁵ are located in census tracts with a poverty rate of 40% or more, a rate that is nearly four times higher than that for welfare households not receiving housing assistance. Public housing developments also exhibit severe concentrations of households with low incomes, high welfare dependency rates, and low levels of education (Newman and Schnare, 1993). The census tracts of privately owned assisted units are significantly less distressed than those of public housing, but

⁴Using the PSID-Assisted Housing Database, we estimate that 88.9% of public housing units and 63.9% of units in privately owned assisted housing are located in developments with more than 50 units.

⁵Family developments typically exclude elderly tenants.

they are no better than the neighborhoods of welfare recipients (Newman and Schnare, 1997). Likewise, compared to families in public housing (or those using certificates or vouchers), tenants in privately owned assisted housing exhibit higher incomes, lower welfare dependency rates, higher educational achievement, fewer children, and smaller concentration of female heads (Newman and Schnare, 1993). How this compares to the tenant profile in unsubsidized developments of similar size and location is unknown.

Although a substantial body of work attempts to document neighborhood effects,⁶ the self-selection of families into neighborhoods presents a methodological difficulty that renders most findings unreliable (Moffitt, 1999). Thus, it is difficult to predict the size of neighborhood effects, if any, associated with living in assisted housing developments. However, because we develop plausible instruments for two types of housing assistance with markedly different contextual features, the present research can potentially shed some light on this important topic. If the concentration of disadvantaged neighborhoods hurts life chances, as posited by collective socialization and epidemic models of neighborhood effects (Jencks and Mayer, 1990), both neighborhood aspects of public housing—the development and the surrounding neighborhood—suggest worse outcomes for children who grow up there compared to children exposed to privately owned assisted developments. On the other hand, if Duncan (1994) is right that the proportion of middle-class neighbors is more important than the proportion of very low-income neighbors for children's educational attainment, then we would not expect much difference between public housing and privately-owned assisted housing.

Finally, all the elements of the housing assistance bundle—the subsidy, the development, and the surrounding neighborhood—could indirectly affect children's development by affecting parental behavior. For example, the more concentrated disadvantage in public housing or its greater distance from job opportunities could adversely affect a parent's employment. While there is little empirical work on whether housing assistance affects adult behavior, the sparse evidence that exists indicates that the impact is small (Murray, 1980; Houser and Dickert-Conklin, 1998; Reingold, 1997).

Past research provides a mixed picture of when during childhood these two sets of effects—the effects of the subsidy and the effects of the development and neighborhood—are likely to be strongest. One clear theme in the child development literature is that early childhood is a critical formative period in a child's life (e.g., Brooks-Gunn *et al.*, 1997). Yet Aber (1997), Chase-Lansdale *et al.* (1997), and Newman *et al.* (1999), for example, suggest that neighborhood effects are most prominent in middle or late childhood when children spend more time outside the home. Newman *et al.* (1999) found that residential moves in early childhood had significant negative effects on later educational attainment,

⁶See Jencks and Mayer (1990) and Gephart (1997) for surveys of this literature.

while the negative effect of living in an assisted housing environment on educational attainment was most prominent for those exposed to housing assistance during middle childhood. Unfortunately, small sample sizes and methodological problems weaken the generalizability of these results.

II. METHODS

We estimated the impact of housing assistance on three different measures of educational outcomes at age 20: (1) years of education; (2) high school graduation; and (3) acquisition of postsecondary education. Although years of education is a straightforward measure of educational attainment and has the advantage of being a continuous measure, high school graduation and the acquisition of postsecondary education are less sensitive to outliers and departures from normality, and also provide a more nuanced understanding of how housing assistance may affect educational attainment.⁷ For each outcome measure, we tested three alternative specifications of the effect of exposure to assisted housing: (1) whether the child ever lived in assisted housing at some point before age 15; (2) the number of years that a child lived in assisted housing between ages 1–15; and (3) whether the child lived in assisted housing for three or more years in each of three childhood stages: early childhood (ages 1–5), middle childhood (ages 6–10), and late childhood (ages 11–15).

In addition to testing the direct effect of housing assistance receipt on educational attainment, we also tested the interaction between housing assistance and the number of years a child lived in a big city (population of 500,000 or more). The goal was to ascertain whether poorly maintained or distressed housing had worse effects on children than well-maintained, nondistressed housing. Distressed assisted housing developments were predominantly located in big cities during the study period.⁸ This interaction was tested by childhood stage in order to capture the timing of housing assistance spells and therefore, whether these spells coincided with living in a big city.⁹

Instruments for Housing Assistance

A major difficulty in using nonexperimental data to gauge the effects of housing assistance on early adult outcomes is that assisted households may be

⁷Years of education was analyzed using OLS, and probit was used for high school graduation and acquisition of post-secondary education.

⁸We rejected alternative indicators of distress, such as the census tract poverty rate, because of their likely endogeneity with housing assistance receipt.

⁹The instrumental variables for the other two housing assistance specifications (“ever assisted” and “number of years assisted”) do not capture the timing of housing assistance spells. Therefore, they provide no means of determining whether these spells coincided with big city residence.

systematically different from unassisted households; it is unlikely that measures of all of these differences are available in any survey. In the present case, for example, parents of families in assisted housing may have different attitudes, values, and aspirations for their children from those of families living elsewhere, but data on these factors are not included in the PSID. To the extent that unmeasured characteristics affect the educational outcomes being examined here, the failure to control for them could bias results.

We address this selectivity problem with a two-stage instrumental variable approach. This statistical method requires one or more “instruments,” that is, variables that are correlated with housing assistance receipt but are otherwise unrelated to educational attainment. These instruments are included in a first-stage model predicting housing assistance receipt. The predicted values (or instrumental variables) from this first-stage model are then substituted for the actual indicators of housing assistance receipt in the main, second-stage model, which estimates the effects of assisted housing on outcomes. We used probit analysis to estimate the first stage models predicting whether a child was ever assisted (the first housing assistance specification) or spent the majority of years in assisted housing during each of the three childhood phases (the third housing assistance specification). Years in assisted housing (the second specification) was estimated using tobit because values of this variable were clustered at or near zero.

Our selection of an instrument capitalizes on the marked spatial variation in the availability of housing assistance per income-eligible household (Kingsley and Tatian, 1999). The instrument is based on a county-level measure of the number of assisted housing units per income-eligible family in each county.¹⁰ This measure is appealing because households are more likely to be assisted if they live in places where housing assistance is more readily available. However, the supply of assisted housing units may be determined, in part, by factors that could also affect educational outcomes. To purge the supply measure of this potential endogeneity, we regressed it on a vector of local area characteristics and used the residuals as instruments.¹¹ For each sample member, there were 15 such instruments (one for each year ages 1–15) for each type of housing assistance. We reduced this to six by taking the mean and the maximum over each of three stages of childhood (ages 1–5, 6–10, and 11–15). In univariate tests, all of the instruments for public housing were found to be significantly associated with housing assistance receipt ($p < 0.01$). For privately owned assisted housing, only the late childhood instruments (ages 11–15) were satisfactory.

¹⁰See Newman and Harkness (1999) for a detailed description of the data and methods used in constructing this instrument.

¹¹The characteristics in this regression were: the population (logged), percent of families with incomes below poverty, percent white population, percent of population age 65 or older, percent of adults with a college degree, the ratio of median rent to median income, and the percent of households with a female head. Dummy variables for the state of residence were also included. The results of these regressions are available from the authors.

Tables I and II show the first-stage model results for public and privately owned assisted housing, respectively. For both types of housing assistance, the instruments generally performed well. They performed best in models predicting whether a child lived primarily in assisted housing during middle childhood (ages 6–10) or late childhood (ages 11–15).¹² With one exception, the instruments in these models were jointly significant at $p < .01$. The instruments also predicted years in public housing between ages 1–15 at $p < .10$ significance. They were least effective in predicting whether a child ever lived in assisted housing.

Control Variables

Table III provides univariate statistics for variables used in the models. The control variables measured over ages 1–15 included in the models are: (1) demographics (whether black, female, year born, average family size, and mother's age at birth); (2) welfare dependence (whether ever relied on welfare, average cash value of transfer income); (3) earnings and employment of household head (average annual labor income specified as a piecewise linear spline with a knot at \$10,000), whether very low work hours (less than 200 hours annually, the number of childhood stages in which the mother worked full time); (4) other parental characteristics (mother's educational attainment, number of years household head disabled); (5) family structure (number of years with single parent, whether a marital change occurred); (6) housing tenure (number of years as homeowner, number of years with a residential move); (7) geography (number of years in a big city (population more than 500,000) and in a small city (population 100,000–500,000), indicators of the primary state of residence).

Most of these variables were selected as general measures of characteristics of the individual or family disadvantage. But in contrast to other studies of similar outcomes, we also control for housing tenure and geographical characteristics.¹³ Housing tenure is included both because it is an indicator of household disadvantage and also because evidence suggests that homeownership may exert a positive effect on child development (Green and White, 1997). City size is included as an independent variable because school quality may differ for large cities.

We do not control for any other features of the neighborhoods where the developments are situated because such variables are likely to be endogenous. Thus, estimates for the effects of housing assistance include both the assisted housing itself and the surrounding neighborhood. Finally, indicators of the child's primary state of residence are included to control for state-level variations in welfare, education, and employment programs that could potentially affect outcomes. Huber–White standard errors were used in all models to account for the nonindependence of sibling observations.

¹²The exception was years in public housing between ages 6–10, where $p = .076$.

¹³We also considered including measures of the housing cost burden but data on housing cost for homeowners is sketchy at best in the PSID and the quality of rental cost data is questionable.

TABLE I
First-Stage Model Results Predicting Residence in Public Housing

Variable	Ever in public housing 1-15		Years in public housing 1-15		>2 years in public housing 1-5		>2 years in public housing 6-10		>2 years in public housing 11-15	
	dF/dx	$P > z $	Coef.	$P > t $	dF/dx	$P > z $	dF/dx	$P > z $	dF/dx	$P > z $
Instruments										
Average 1-5	-0.156	0.711	-0.164	0.487	0.043	0.415				
Average 6-10	-0.302	0.452	-0.043	0.822			0.961	0.162		
Average 11-15	-0.689	0.030	-0.336	0.024					-0.665	0.015
Maximum 1-5	0.202	0.508	0.141	0.419	-0.033	0.530				
Maximum 6-10	0.151	0.589	0.014	0.926			-0.566	0.404		
Maximum 11-15	0.809	0.008	0.432	0.004					0.900	0.001
Joint significance of instruments										
	0.190		0.088		0.573		0.076		0.001	
Covariates										
Black	8.681	0.002	7.104	0.000	1.569	0.001	8.785	0.021	4.509	0.026
Year born	-0.272	0.439	-0.134	0.499	-0.054	0.271	-0.002	0.997	-0.164	0.598
Female	1.287	0.463	0.218	0.824	0.045	0.845	0.551	0.813	-2.574	0.070
Mother's age at birth	0.845	0.034	0.252	0.253	0.036	0.463	-0.582	0.265	-0.250	0.407
Earnings (in \$10,000s)	10.606	0.079	4.792	0.161	0.457	0.497	5.470	0.457	1.568	0.768
Earnings above \$10,000	-15.833	0.009	-7.848	0.023	-0.505	0.472	-6.828	0.390	-6.548	0.271
Ever received public assistance	7.895	0.007	8.379	0.002	0.535	0.102			4.407	0.008
Average public assistance income										
(in \$1,000s)	1.330	0.012	0.878	0.004	0.162	0.006	1.550	0.004	0.310	0.232
Ever in a one-parent family	3.403	0.385	0.988	0.676	0.122	0.846	3.837	0.530	-0.187	0.979
Years in a one-parent family	-0.310	0.351	-0.162	0.397	0.035	0.811	-1.321	0.383	0.121	0.931
Annual hours head worked	-2.370	0.454	-0.806	0.661	-0.253	0.462	0.210	0.952	1.220	0.674

<200 annual hours worked	1.688	0.676	0.885	0.662	-0.451	0.035	7.913	0.197	5.593	0.188
Ever experienced a marital change	-0.532	0.827	-0.344	0.800	-0.276	0.369	-1.016	0.783	5.322	0.355
Mother's years of education	-0.706	0.081	-0.354	0.113	0.004	0.931	-0.550	0.310	-0.093	0.776
Years with disabled household head	-0.173	0.485	-0.190	0.180	-0.227	0.006	-0.545	0.458	-0.363	0.418
Average family size	-0.230	0.758	-0.147	0.725	-0.080	0.320	-0.093	0.908	1.061	0.026
Whether mother ever worked full-time	1.412	0.190	0.691	0.254	0.305	0.299	5.141	0.152	2.608	0.205
Years with a move	0.521	0.155	-0.160	0.436	-0.222	0.029	-3.066	0.005	-4.831	0.000
Years homeowner	-1.161	0.000	-0.820	0.000	-0.490	0.001	-3.638	0.001	—	—
Years in city with population >500,000	0.083	0.735	-0.006	0.965	-0.156	0.109	-0.494	0.644	-0.403	0.524
Years in city with population 100,000-500,000	0.459	0.104	0.320	0.046	0.009	0.930	0.809	0.447	0.882	0.159
(Results for state dummies not shown)										
R^2	0.401		0.265	0.439			0.402		0.464	

Source. PSID-Assisted Housing Database.

Note. $dF/dx = 100 \times$ change in probability with respect to change in variable, estimated with all variables set at their means.

TABLE II
First-Stage Model Results Predicting Residence in Privately Owned Assisted Housing

Variable	Ever in private assisted housing 1-15		Years in private assisted housing 1-15		>2 years in private assisted housing 6-10		>2 years in private assisted housing 11-15	
	dF/dx	$P > z $	Coef.	$P > t $	dF/dx	$P > z $	dF/dx	$P > z $
Instruments								
Average 1-5								
Average 6-10								
Average 11-15	-0.171	0.839	0.218	0.571	0.080	0.132	0.031	0.205
Maximum 1-5								
Maximum 6-10								
Maximum 11-15	0.574	0.457	0.033	0.927	-0.022	0.650	-0.008	0.722
Joint significance of instruments								
	0.323		0.221		0.009		0.004	
Covariates								
Black	9.157	0.000	4.076	0.001	0.101	0.393	-0.009	0.847
Year born	0.197	0.573	0.094	0.563	0.003	0.868	-0.007	0.334
Female	-2.561	0.134	-1.161	0.147	-0.072	0.401	-0.015	0.632
Mother's age at birth	0.282	0.500	0.197	0.313	0.034	0.158	0.011	0.142
Earnings (in \$10,000s)	-1.859	0.748	-0.648	0.811	0.308	0.258	0.170	0.089
Earnings above \$10,000	2.656	0.639	1.300	0.624	-0.184	0.492	-0.125	0.206
Ever received public assistance	-2.842	0.327	-1.120	0.365	-0.063	0.637	0.017	0.708
Average public assistance income (in \$1,000s)	-1.970	0.000	-0.949	0.000	-0.018	0.466	-0.007	0.396
Ever in a one-parent family	-0.743	0.836	-0.834	0.616	-0.002	0.994	0.097	0.460
Years in a one-parent family	0.213	0.466	0.187	0.171	0.085	0.076	0.005	0.820
Annual hours head worked	-4.490	0.096	-2.268	0.078	-0.279	0.036	-0.078	0.116

<200 annual hours worked	0.978	0.842	0.544	0.798	-0.081	0.575	1.607	0.081
Ever experienced a marital change	4.694	0.052	2.659	0.014	0.543	0.128	0.343	0.185
Mother's years of education	-0.026	0.946	0.060	0.738	0.010	0.640	0.004	0.620
Years with disabled household head	0.320	0.211	0.120	0.312	-0.032	0.324	-0.012	0.259
Average family size	0.266	0.694	0.145	0.642	0.023	0.478	-0.011	0.316
Whether mother ever worked full-time	1.752	0.096	0.814	0.103	0.130	0.354	0.049	0.309
Years with a move	1.115	0.001	0.380	0.013	-0.020	0.589	-0.053	0.009
Years homeowner	-0.685	0.001	-0.407	0.000	-0.056	0.079	-0.111	0.043
Years in city with population > 500,000	-0.857	0.000	-0.353	0.001	-0.002	0.938	0.009	0.430
Years in city with population 100,000-500,000	-0.597	0.012	-0.298	0.010	-0.070	0.146	-0.034	0.010
(Results for state dummies not shown)								
R^2	0.234		0.155		0.415		0.497	

Source: PSID-Assisted Housing Database.

Note. $dF/dx = 100 \times$ change in probability with respect to change in variable, estimated with all variables set at their means.

III. DATA

This research relies on a unique database, the PSID–Assisted Housing Database, which we have developed by matching all sample addresses in the 28-year Panel Study of Income Dynamics (PSID) to the addresses of assisted housing units across the nation.¹⁴ The PSID is an ongoing longitudinal survey of U.S. households begun in 1968 by the Survey Research Center of the University of Michigan. Low-income families were initially oversampled, but statistical weights have been developed to adjust both for the differential initial sampling probabilities and for differential nonresponse that has arisen since the beginning of the study. By following all members of its sample over time, including children as they leave their parents' homes, the PSID maintains a representative sample of the nonimmigrant U.S. population and of major subgroups of the population.

The database of assisted housing addresses constitutes the closest approximation to a national census of assisted housing that we are aware of. It is based on eight sources including several of HUD's administrative and program databases, and surveys we have conducted with all housing agencies across the nation including state departments of housing and community development, housing finance agencies, and Farmer's Home district offices. Programs covered by the database include public housing, other HUD project-based developments (which we refer to here as "privately owned assisted housing"), Farmer's Home Section 515, the Low-Income Housing Tax Credit, and state rental assistance programs (Newman and Schnare, 1997).

Because the PSID–Assisted Housing Database identifies whether the sample member receives housing assistance through address matches of properties known to receive housing assistance and not through respondent self-reports, it overcomes the serious problem of reporting errors of respondents answering survey questions about whether they live in assisted housing. Recent evidence suggests that such self-reports are highly inaccurate (Shroder and Martin, 1996).

The analysis sample is drawn from nine PSID cohorts born between 1967 and 1976. The observations on the effects of exposure to assisted housing for these cohorts cover the 22-year period from 1968 through 1990 when these individuals were less than 16 years old. Educational attainment at age 20 was measured beginning in 1987 through 1995. Each individual was required to have complete family data for each year between ages 1–15 to be included in the analysis. This restriction imposed only a modest loss of sample because few individuals who dropped out of the PSID prior to age 15 returned at a later time.

Attrition bias is a potentially more serious problem. Attrition in the PSID is substantial and is more prevalent among disadvantaged households (Fitzgerald *et al.*, 1998a). However, recent studies, including one by the authors based on a

¹⁴Complete details on the construction of the PSID–Assisted Housing Database can be found in Newman and Harkness (1999).

sample of children ages 10–16, conclude that despite this attrition, model estimates are not biased (Fitzgerald *et al.*, 1998b; Newman and Harkness, 1999; Zabel, 1998). Unfortunately, we cannot use the methods applied in these studies to test for attrition biases in the current analysis because the PSID does not contain data on educational outcomes that occurred at an earlier age (e.g., grade retention, test scores).

The analysis sample includes those who lived in assisted housing at some point prior to age 15, those who were income-eligible for housing assistance but were unassisted, and those who were siblings of either an assisted or an income-eligible sample member. Our best approximation of HUD's income eligibility threshold for this period relies on counties as a proxy for income limit areas and family income below 80% of the county median income for the varied income thresholds over this 22-year period. County median incomes come from the decennial census and are interpolated linearly for intercensal years.¹⁵

We tested several different eligibility definitions for constructing the analysis sample. This serves as a diagnostic tool because similar results should be obtained on different samples if the models are correctly specified. While the alternative samples we tested generated similar results, the results reported here are based on having income below 80% of the county median for three out of the five years in any childhood stage (ages 1–5, 6–10, and 11–15). This yields a sample of unassisted children whose family earnings, labor market, and welfare usage is comparable to that of children who ever lived in privately owned assisted housing, as discussed below.

Table III illustrates several key characteristics of the sample. There are 135 cases of public housing exposure, 102 cases of exposure to privately owned assisted housing, and 12 children who experienced both types of housing assistance. Residents of public housing have the most disadvantaged backgrounds and the worst outcomes on virtually all measures. On average, they spent about half their childhood years living in assisted housing. Only 61% of them graduated from high school, compared to 77% of children whose families were eligible for housing assistance but were unassisted. The rate of postsecondary education was only half as high among public housing residents as among those who were eligible but unassisted. The differences in educational attainment for children who lived in public housing compared to their unassisted counterparts are all statistically significant ($p < 0.05$). The families of children in public housing had substantially lower earnings and work hours and were much more likely to rely on welfare (AFDC, Food Stamps, or "other" welfare) than the families of unassisted children. Children in public housing were also significantly more

¹⁵We chose counties over MSAs for two reasons: counties cover the entire U.S. while MSAs do not, and MSA boundaries shift over time. We selected the 80% of county median cutoff because it was the modal eligibility threshold for the 22-year period.

TABLE III
Selected Characteristics of the Sample

Variable	Ever in public housing	Ever in privately owned assisted housing	Eligible but unassisted
<i>N</i>	135	102	712
Age 20 educational outcomes			
Years of education	11.6	12.0	11.9
High school graduate	61%	77%	71%
Some post-secondary education	13%	21%	24%
Age 1–15 background measures			
Years in assisted housing	7.4	4.2	0.0
Mother's years education	11.4	12.0	12.0
Mother a high-school graduate	56%	79%	72%
Average household size	5.1	4.5	4.8
Years household head disabled	3.3	2.7	2.6
Black	93%	74%	51%
Average earnings (in \$10,000s)			
Mean	0.96	1.62	1.75
Median	0.91	1.38	1.68
Average hours worked annually (head)	1,082	1,446	1,603
Ever on welfare	97%	80%	73%
Average transfer income (in \$1,000s)			
Mean	4.25	2.02	2.14
Median	3.18	0.98	0.41
Ever in a one-parent family	88%	83%	60%
Years in a one-parent family	8.8	7.7	5.1
Whether a marital change	53%	65%	38%
Number of residential moves	4.5	5.4	3.7
Years as homeowner	1.5	3.1	7.1
Years in city > 500,000 pop.	5.5	4.3	3.1
Years in city 100,000–500,000 pop.	3.3	2.4	2.2
Average tract poverty rate	34	22	21

Source. PSID-Assisted Housing Database.

Notes. All monetary values expressed in 1990 dollars. All figures are means unless otherwise noted.

likely to live in single-parent families. They more often lived in big cities and were exposed to significantly higher rates of poverty in their census tracts.

The picture is more mixed for those who lived in privately owned assisted housing. These children lived in assisted housing for a much shorter period (4.2 versus 7.4 years) than those who lived in public housing, suggesting that reliance on housing assistance was more temporary for them. The key characteristics distinguishing them from their unassisted peers are their greater likelihoods of living in a single-parent family and in a family undergoing a change in marital

status, but their earnings, work hours, welfare reliance, and educational attainment are comparable to those unassisted. The rate of high school graduation for children who lived in privately owned assisted housing is somewhat higher than that of their unassisted counterparts ($p < 0.10$).

IV. RESULTS

The results of the multivariate direct effects models for the housing assistance variables are shown in Table IV. When controls for demographics and family background are added, the statistically significant association between public housing and reduced educational attainment vanishes. Educational outcomes are unaffected by whether a child ever lives in public housing, the duration of residence, and the stage of childhood in which he or she lives there. These results show that it is the more disadvantaged family background of children who live in public housing, in particular lower levels of earnings, parental education, and economic self-sufficiency, which lead to worse educational outcomes, not public housing itself.

The effects of public housing in the instrumental variable model tend to be more positive than they are in the uninstrumented results. For example, the coefficient on the effect of ever living in public housing on years of education shifts from 0.06 at 70 percent significance in the uninstrumented model to 0.28 at 38 percent significance in the instrumented results. This change suggests that the unmeasured characteristics of families in public housing—as well as their measured characteristics—have a detrimental impact on years of education.

As expected, exposure to privately owned assisted housing tends to have somewhat more positive effects than exposure to public housing, but the difference is slight. Unlike public housing, no clear pattern emerges from comparing the results of the uninstrumented and instrumented models for privately owned assisted housing. This could occur because there is less selection bias for tenants entering privately owned assisted housing since they gain entry to this type of assisted housing the same way they enter private market rental housing, as noted earlier.

Table V presents the results of the models interacting housing assistance with years lived in a big city, our proxy for poorer quality housing developments. None of these interactions is statistically significant.

V. DISCUSSION

The most significant finding of this analysis is that the inferior educational outcomes of children who live in public housing disappear when measured

TABLE IV
Regression Results

	Public housing				Privately-owned subsidized housing			
	Uninstrumented		Instrumented		Uninstrumented		Instrumented	
	Coef.	$P > t $	Coef.	$P > t $	Coef.	$P > t $	Coef.	$P > t $
Years of education								
Ever assisted	0.057	0.697	0.278	0.378	0.188	0.192	0.569	0.276
Years assisted	0.004	0.847	0.040	0.351	0.019	0.387	-0.039	0.735
Assisted 0-5	-0.222	0.285	-0.230	0.597	0.279	0.210	—	—
Assisted 6-10	-0.105	0.671	0.257	0.481	0.004	0.985	0.125	0.877
Assisted 11-15	0.362	0.121	0.010	0.974	0.084	0.759	0.120	0.782
Completed high school^{a,b}								
Ever assisted	0.008	0.881	-0.035	0.788	0.090	0.084	0.057	0.807
Years assisted	0.002	0.741	-0.002	0.897	0.013	0.243	-0.015	0.780
Assisted 0-5	0.000	1.000	-0.008	0.959	0.053	0.686	—	—
Assisted 6-10	-0.036	0.719	-0.020	0.892	0.057	0.650	-0.267	0.409
Assisted 11-15	0.048	0.534	-0.076	0.527	0.129	0.237	0.492	0.016
Attained some post-secondary education^{a,b}								
Ever assisted	0.014	0.776	0.090	0.389	-0.005	0.904	0.183	0.313
Years assisted	0.002	0.789	0.013	0.289	-0.003	0.724	-0.051	0.415
Assisted 0-5	-0.059	0.347	-0.052	0.723	0.100	0.317	—	—
Assisted 6-10	0.067	0.420	0.294	0.021	-0.024	0.820	0.163	0.530
Assisted 11-15	0.006	0.934	-0.117	0.293	-0.084	0.345	-0.243	0.155

Source. PSID-Assisted Housing Database.

^a Probit coefficients transformed to represent the marginal change in probability with respect to the variable with all other variables in the model set to their means.

^b Significance levels refer to the underlying coefficient.

characteristics are taken into account. Further controlling for unmeasured characteristics yields more positive estimates, but virtually none are statistically significant. These findings are similar to those on the effects of AFDC and noncash transfer programs on children, which indicate that public assistance does not harm—and may possibly help—children’s development (Currie, 1995). The results are also roughly consistent with those of Currie and Yelowitz (2000), who found no effect of public housing on grade retention after controlling for observables, and a strong positive effect when controls for unobservables were added.

Currie and Yelowitz’s finding of a positive effect may arise because of their much larger sample, but it could also be spurious, arising from measurement error. Their instrument for public housing residence relies on self-reports of housing assistance from Current Population Survey (CPS) data, but self-reported housing assistance has been documented as unreliable (Shroder and Martin, 1996). The fact that nearly 5% of their CPS sample, which includes both owners and renters, report public housing residence, while according to HUD only 3% of *renters* live in public housing (U.S. Department of Housing and Urban Development, 1997), suggests that their numbers may be inflated. These “false positives,” who are likely to be more affluent than correctly identified public housing residents (Newman and Schnare, 1993), may explain Currie and Yelowitz’s strong positive effects in their instrumented models.

Our results neither confirm nor negate any of the explanations suggested at the outset for why housing assistance might affect children’s educational attainment. We find no strong positive impacts that would indicate that children benefit from the increased disposable income, the physical quality, or the residential stability associated with assisted housing, but neither do we find negative ones, which would indicate that children are negatively affected by the environments of either the development itself or the surrounding neighborhood. We also find no major differences between the effects of public housing and privately owned assisted housing, despite large differences in household characteristics in both the neighborhood surrounding the development and within the development itself. For example, during periods of residency in public housing, children in our sample experienced an average neighborhood poverty rate of 43%, compared to 21% for periods of residency in privately owned assisted housing. Other analyses indicate that over the study period, the average earnings of families in public housing were roughly half the earnings of families in privately owned assisted housing (Newman and Harkness, 1999). The fact that we find little difference in the impacts of these two different types of assisted housing suggests that the effects of concentrated neighborhood disadvantage on educational outcomes may be minimal.

An alternative explanation for our findings is that it is the absence of affluent neighbors rather than the presence of poor ones that has a stronger effect on educational outcomes of children, as reported by Duncan (1994). Although there

Attained some postsecondary education ^{a,b}													
Assisted 0-5	-0.099	0.081	-0.123	0.467	0.036	0.685							
Assisted 6-10	-0.054	0.477	0.287	0.043	-0.116	0.129			0.168				0.529
Assisted 11-15	0.152	0.196	-0.072	0.527	-0.076	0.361			-0.175				0.310
Assisted x years in big city 0-5	0.040	0.030	0.028	0.457	0.038	0.144							
Assisted x years in big city 6-10	0.060	0.049	0.039	0.442	0.078	0.000			0.056				0.419
Assisted x years in big city 11-15	-0.083	0.022	-0.071	0.159	-0.047	0.081			-0.077				0.184
Years in big city 0-5	-0.022	0.286	-0.014	0.488	-0.022	0.286			-0.014				0.488
Years in big city 6-10	0.021	0.393	0.029	0.256	0.021	0.393			0.029				0.256
Years in big city 11-15	-0.001	0.938	-0.007	0.730	-0.001	0.938			-0.007				0.730

Source: PSID-Assisted Housing Database.

^a Probit coefficients transformed to represent the marginal change in probability with respect to the variable with all other variables in the model set to their means.

^b Significance levels refer to the underlying coefficient.

are large disparities in earnings between public housing and privately-owned assisted housing tenants, the proportion of households with incomes above \$30,000 is very low in both settings: 1.6 and 5.3%, respectively (Casey, 1997). If children who live in assisted housing rarely venture into the surrounding neighborhood (Shlay and Holupka, 1991), then the lack of middle-income residents in both types of assisted housing may explain the lack of positive effects of either type of housing on educational attainment. Additional research into this question is warranted.

The analysis also raises an interesting methodological insight. The instruments for housing assistance, and particularly for public housing, satisfy the criteria of a good instrument, and are therefore likely to provide unbiased estimates. As such, it is useful to compare these results from the two-stage models with those from the primary alternative for generating unbiased estimates of the impacts of neighborhoods on children's outcomes, namely, sibling difference models (Aaronson, 1995; Plotnick and Hoffman, 1993). Although results using either approach are generally not statistically significant, the sibling difference models consistently produce more negative estimates of the effect of housing assistance, suggesting a bias from the heterogeneity between siblings. A key assumption of the sibling difference approach is that unobserved family background characteristics are invariant between siblings. But if moves into assisted housing are associated with events within the family that are detrimental to child development, such as marital breakup or job loss, the assumption is invalid. It is plausible that the more negative estimates of the impact of housing assistance in the sibling models result from these unobserved differences in family background, not from housing assistance itself. The instrumental variable technique is not affected by this problem. Because the processes by which families select housing and neighborhoods are closely related, the discrepancy between the two approaches for housing assistance suggests that sibling difference estimates of the impacts of neighborhoods on children's educational outcomes may be unreliable.

Further research is required to disentangle the complex bundle of attributes inherent in assisted housing, and to estimate the impact of each on children's outcomes. Taken at face value, our failure to find that the effect of assisted housing located in big cities differs from that of other assisted housing, or that public and privately owned assisted housing have different effects, suggests that the social and environmental contexts of assisted housing developments do not influence children. But our city size proxy for housing quality is hardly ideal, and our models are not sufficiently nuanced. It would clearly be desirable to explicitly model the effects of features of the development such as its size, configuration, and tenant profile. Research is also needed to determine the effects of housing quality and stability—assisted or not—on children's outcomes, something we know very little about (Newman, 1999).

The questions of whether housing assistance affects adult behavior and whether

these behavioral changes influence children are also unexplored. While the literature suggests that public assistance programs reduce adult labor force participation (Moffitt, 1992), the transferability of these results to the case of housing assistance, which is a more complex bundle of locational and physical attributes than other programs, is unclear.

Finally, all of these research questions also need to be addressed for tenant-based housing assistance, which come in the form of Section 8 certificates and vouchers. This is particularly the case because federal housing assistance has shifted dramatically away from project-based assistance in the form of public housing and privately owned assisted housing and toward tenant-based subsidies. Because assisted families use their certificates and vouchers to rent housing in the private rental market, they have greater choice over where they live. As a result, the poverty rates in their neighborhoods are considerably lower than in the neighborhoods of either public housing or privately owned assisted housing (Newman and Schnare, 1997). Research on the Gautreaux program and the Moving to Opportunity demonstration program is making a significant contribution in this area, but can usefully be supplemented with nonexperimental studies that have the advantage of being able to examine long-term effects.

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